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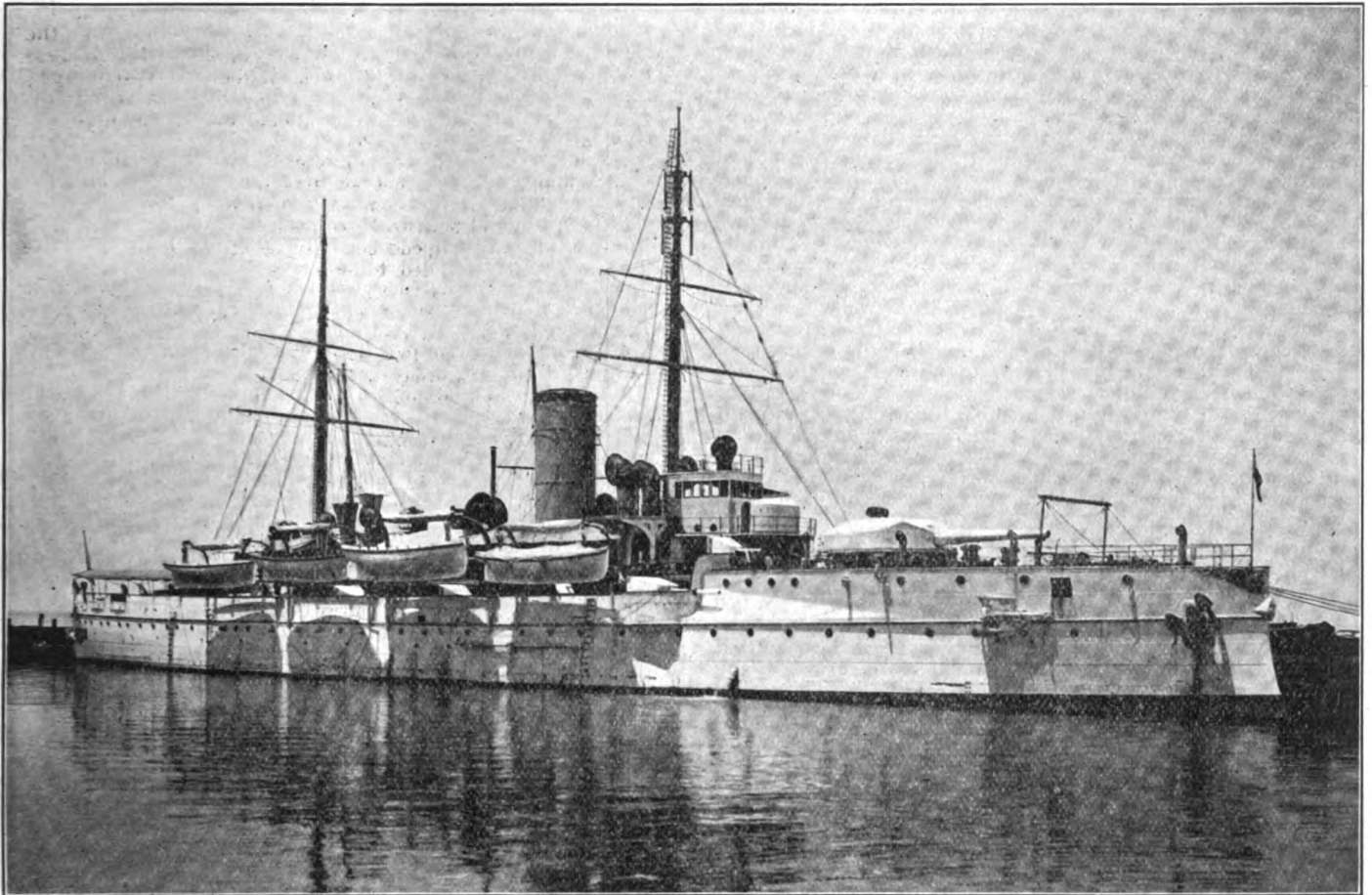
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No. 12

## LAUNCH OF ARMORED CRUISER MARYLAND.

Newport News, Va., Sept. 16.—More than 20,000 people witnessed the launching of the new 15,000-ton armored cruiser Maryland Saturday afternoon at the yard of the Newport News Ship Building & Dry Dock Co. An unfortunate mishap, the first of the kind in the history of this ship yard, occurred at the foot of the ways before the monster hull went entirely overboard. About 60 ft. of the vessel stuck on the ways, wood-bound on account of the melting and burning up of the tallow by the extreme heat. The thermometer hovered around 90° and the immense crowd of spectators had to resort to every known means to keep cool and then without success. When Miss Jennie Scott Waters broke

ploughed the water under their sterns, but could do nothing. The Newport News pulled and pulled and finally broke the hawser. The attempt to float the vessel then was abandoned and it was decided to await the next flood tide. Repeated attempts were made Sunday and Monday without success. Jacks were used and other means were resorted to. It was suggested by the machinery department officials that they put the new battleship Missouri in service and pull the ship off. This idea was regarded with hesitation, the ship yard officials fearing, it is said, that too much power brought to bear might result in even further complications. The Missouri is about 99 per cent. completed and could be made ready for such service in a few hours.



BATTLESHIP DE RUYTER OF THE DUTCH NAVY.

Holland's latest and best battleship. She has just had her bottom repaired and painted at the Newport News yard—the first Dutch war vessel to go into an American dock.

[Copyright, 1903, by Samuel E. Rusk, Newport News, Va.]

the bottle of champagne against the steel prow with her second throw, the first having failed to baptize the ship, the big hull broke away from her fastenings very slowly and started down the ways in snail-like fashion. It was noticed that she was moving more slowly than did her sister, the West Virginia, which was launched here April 18 in the presence of 30,000 people. It was also noticed that the tallow leaped out from under the sliding ways like so much refined oil, instead of sticking to the ground ways and serving its purpose in giving the vessel its proper momentum for a successful launching. The intense heat melted and set the tallow afire, and as the heavy load passed over it smoke arose from both sides. About six-sevenths of the ship had passed out into the water when the friction between the sliding ways and the ground ways became too great and they became wood-bound. The cradle stuck to the ship and her position was easy and natural. An examination convinced the experts that the vessel was not in any great danger and it was decided to try to pull her off into the water, which had a depth of 25 ft. under her stern, proving the incorrectness of some of the published reports to the effect that her stern had stuck in the mud.

The harbor was thickly dotted with excursion steamers, tugs and sail boats and a number of the steam vessels at once offered their services. Six-inch lines were thrown out to five tugs and to the large Washington steamer Newport News, which brought the official party from the national capital. The little tugs

The fact that the ship was properly started down the ways showed that all of the calculations of Superintendent of Hull Construction M. V. D. Doughty were correctly made. The vessel moved slowly but evenly and surely and would undoubtedly have taken to the water as desired but for the melting and burning up of the tallow, which caused her to lose speed and resulted in insufficient momentum to safely carry her clear of the ways. The Maryland is the heaviest ship, as she stands, ever launched in this country, more than 7,000 tons of material having been used in her construction up to this time. Her military masts are in position, superstructure complete, her boilers installed and other parts placed in position that are usually not put aboard until after a vessel is launched.

Steamers brought excursionists for the launching from Washington, Baltimore, Norfolk and Portsmouth. From Richmond and other points in the state excursion trains brought hundreds of visitors. Gov. Smith of Maryland, his staff and party, and Miss Waters and her party were passengers on one of the Baltimore steamers. From Washington came the official naval party which included, among others, Assistant Secretary of the Navy Charles H. Darling; Rear Admiral Charles O'Neil, chief of the bureau of ordnance; Rear Admiral R. B. Bradford, chief of the bureau of equipment; Paymaster General Henry T. B. Harris; Judge Advocate Samuel C. Lemly; Senator Louis E. McComas, Representatives J. Frederick, C. Talbot, Frank Charles

Wachter, James W. Denny and Sydney E. Mudd, all of Maryland; and John F. Rixey of Virginia. Representatives of Cramp's ship yard, the Carnegie Steel Co., other big ship yards and the newspaper representatives from Washington were also aboard the Newport News. Gov. A. J. Montague of Virginia arrived with his party on a special train over the Chesapeake & Ohio from Richmond. From the navy yard came Rear Admiral Harrington and his staff of officers, and from Fort Monroe came Col. Story and his officers.

All of the preparations for the launching had been carefully perfected and by 1:20 o'clock everything was in readiness for the final step, the severing of the heel piece and release of the ship. The big saw buzzed its way through the stout timbers under the bow of the vessel and at 1:27 o'clock its work was completed. The big hull broke away slowly with a crash. Miss Waters lightly threw the bottle she held towards the ship, but it did not break. President C. B. Orcutt, of the ship building company, reached out and succeeded in catching the bottle. He handed it to Miss Waters, who, this time, threw it with more force, the glass breaking and the foaming champagne racing down the steel wall. The thousands of spectators cheered lustily, the bands played "Maryland, My Maryland," and the ship rode down the ways slowly and majestically. Another perfect launch appeared to be to the credit of the Newport News Ship Building & Dry Dock Co. Before the vessel was entirely off the ways she suddenly stopped and it was seen that she had stuck. An examination of the ground ways plainly indicated the cause. The tallow had burned dry and the ways were wood-bound.

Soon after the guests of the ship yard officials proceeded to Old Point Comfort by steamer to attend the post-launching banquet at the Chamberlin Hotel. There were 600 people around the covers. President Orcutt presided as toastmaster. The toast, "The President of the United States," was drunk standing. United States Senator Thomas S. Martin responded to it. Other toasts were: "Virginia: The Hostess," by Gov. A. J. Montague; "Maryland: Her Citizens, Our Welcome Guests," by Gov. Smith; "The Merchant Marine," Gen. Felix Agnus, editor of the Baltimore American; "The Fair Sponsor," State Senator Robinson of Maryland.

The Maryland is one of the six powerful armored cruisers authorized by the fifty-sixth congress, designed for great speed, coupled with fighting ability and great radius of action. Her general dimensions follow: Length on load water line, 502 ft.; beam, extreme, 69 ft. 6½ in.; draught, on normal displacement of 13,676 tons, 24 ft. 1 in.; full-load displacement, with all ammunition and stores aboard, 15,104 tons; designed indicated horse power, 23,000; speed, 22 knots; coal supply, full bunker capacity, 1,850 tons; complement of officers, 47; complement of seamen, marines, etc., 783. She will have two sets of vertical inverted, triple-expansion engines, designed for 23,000 I. H. P. at 120 revolutions per minute. Each engine will be in a separate watertight compartment, and will have cylinders 38½ in., 63½ in., and two 74 in. in diameter, by 48 in. stroke of piston. Steam of 250 lbs. pressure will be supplied from sixteen water-tube boilers of the Babcock & Wilcox marine type. The boilers will be arranged in six watertight compartments. The total grate surface of the sixteen boilers will be 1,600 sq. ft. and the total heating surface will be 70,944 sq. ft. The smokestacks will be four in number, standing fore and aft.

An armor belt will extend 5 ft. below and 4 ft. above the normal load line and from stem to stern. It will be 16 in. thick at the top, and 5 in. at the bottom. The maximum thickness will be preserved for a depth of 6 ft. from the top. The armor will taper at the stem and stern to a thickness of 3½ in. The armor on the Highborn balanced oval turrets, with inclined port plates, will be 6½ in. thick on the port plate and 6 in. on the sides and rear. The main battery will consist of four 8-in. breech-loading rifles, mounted two in each turret on the centre line of the vessel. There will be fourteen 6-in. rapid-fire guns and a secondary battery of eighteen 3-in. and twelve 3-pounder guns, besides four 1-pounder automatic guns, four 1-pounder rapid-fire guns, six Colt automatic guns, two machine guns, and two 3-in. field guns. With this equipment and protection it is expected that the Maryland could put up a good fight against the average battleship if it became necessary.

#### PHILADELPHIA SHIP BUILDING NEWS.

Philadelphia, Sept. 16.—Among the many improvements planned for the League Island navy yard by Rear Admiral Sigbee, commandant, is that of an imposing entrance to the yards. Plans have been prepared and provide for a structure of solid masonry, to cost \$100,000. In appearance the entrance will be that of a triumphal arch, with main archway of 18 ft. width and two side archways. The structure will be occupied with offices, dormitories, marine quarters and a prison. A new home for the commandant, in colonial style, to cost \$25,000, has also been provided for.

Dr. T. S. Dedrick, of Philadelphia, who saw four years' service in arctic seas and who accompanied Lieut. Peary to the north, but, having a disagreement, remained at Greenland, is of the opinion that Lieut. Peary will find the north pole on his next trip. He said recently: "Each and every expedition brings civilization one step nearer, and man has now established his station within at least two hundred miles of this persistently sought goal. I thought that Peary had it within his grasp a few years ago. If Lieut. Peary does not reach the pole on this dash I am

willing to predict that it will be discovered within the next ten or twelve years."

The bark Nuuanu, Capt. Josslyn, from Honolulu, with 26,500 bags of sugar, made the round trip from New York to Honolulu to this port in eight months and one day—one of the quickest voyages of a sailing vessel recorded for a long time. Another noteworthy marine incident is that of the tug Paoli, which towed the coal barges Gibson and Dunlo, last week, from Rockland, Me., to the Greenwich coal piers, Philadelphia, in 68½ hours. Both coal barges are of 1,600 tons register and had full cargoes. The Paoli averaged 8 knots an hour, a feat never equalled by any boat of her class at this port.

The steel sea-going dredge Atlantic, built for R. A. Parry of San Francisco, by the New York Ship Building Co., was launched at that company's yards Sept. 9, Mrs. H. B. Plummer, wife of one of the company's superintendents, being sponsor. The Atlantic is 145 ft. long, 30 ft. beam and 14 ft. draught. She is fitted with powerful machinery, so arranged that the shoal over which she works is cut away by sharp projecting instruments and the sand pumped up in the vessel's hold and deposited wherever needed. The Atlantic will be used mostly at gulf ports on government work.

The action of the New York board of trade and transportation in appointing a special committee to urge upon the country the imperative need of the revival of American shipping in the foreign trade has already met with cordial endorsement at the hands of many Philadelphia commercial bodies. The daily press has generally commented favorably upon the matter and urged action. Residents of New Jersey, now that they realize the importance of their shipyards and shipping, are apt to urge the building of American vessels, too.

Andrew C. Gray, counsel for the Harlan & Hollingsworth Co., Wilmington, asserts that an arrangement has been made with the creditors of the company whereby the plant will be kept in operation and new work received. Another test for speed has been allowed the torpedo boat Stringham, built by the company, which recently failed to make her contract speed of 30 knots. It is thought that when her machinery is worked down smoother that she will come up to the required speed. The Stringham has 7,200 I. H. P.

The auxiliary cruiser Prairie was floated out the dry dock at League island last Saturday morning, after having her bottom finished, scraped and painted. The Panther, a sister ship, which arrived the day before, went on the dry docks Saturday afternoon, and will receive a similar overhauling. Both vessels will go to the coast of Cuba after leaving the yards.

At Peter Hagen's shipyard, East Camden, the 1,600 ton steamship D. B. Metcalf is to be converted into a 2,000-ton steamer. The Metcalf was originally built in a Maine shipyard; was rebuilt in Norway and on her last trip carried 8,000 feet of lumber. The iron steamer Berks, at the same yards, is being converted into a coal barge.

The owner of the Italian bark Erasmo, asserting that the shipyard prices of this country are extravagant, will have his vessel towed from this port to Italy. He has engaged the British tug Tritan to do the job. The Tritan left Dartmouth, England, Sept. 6 to undertake the work. It is one of the longest towing undertakings on record.

The board of director of the Maritime Exchange and President J. S. W. Halton have contracted for the construction of a new steel signal tower at the Delaware breakwater. It will be 115 ft. high and will take the place of an old condemned station. Signals are to be displayed from a large halyard at the foot of the flagstaff.

Anxiety is felt for the sailing vessel Helen Brewer, almost 200 days out from Sourabaya, with a cargo of sugar, for this port. She is long overdue. She is an American vessel, 248 ft. long, 39 ft. beam and 22 ft. deep; 1,607 tons gross register. She is owned by C. Brewer & Co., Ltd., and carries a crew of twenty-six men.

The torpedo boat Hoskins reached the League Island yards from Cramps Monday. She will be fitted out for her speed trial. She is of the new type of torpedo boats and has four torpedo tubes and two six-pounders fore and aft.

Immense quantities of material are being received at the yard for use in the construction of the immense dry dock, work upon which is being prosecuted night and day. A large amount of repair work is also going on.

Rear Admiral Silas Casey, who was retired Sept. 10, will make his future home in this city. He was commandant of the League Island navy yard for some time.

Capt. Charles S. Bromwell, government engineer stationed at New Orleans, recently opened bids for the construction of a stern-wheel steamboat for use on the Mississippi river. The bids were as follows: The Johnson Iron Works, Ltd., New Orleans, La., \$14,750; N. H. Sweeney Shipyard & Foundry Co., Jeffersonville, Ind., \$14,000; Southern Marine Works, New Orleans, La., \$17,995; Chas. P. Willard & Co., Chicago, Ill., \$17,500; The Johnson Iron Works, Ltd., New Orleans, La., (modified proposal), \$11,955. None of the bids were within the sum appropriated and Capt. Bromwell thereupon rejected them all and requested the bidders to submit modified proposals. He authorized them to modify the specifications in whatever manner they pleased so long as they did not impair the strength or speed of the boat. The modified bids will be opened this week.

## SHIP BUILDING AND SHIPPING IN SCOTLAND.

Glasgow, Sept. 3.—The month of August has been a busy one in our ship yards so far as the completion of vessels on the stocks. The total tonnage put into the water by Scotch builders was thirty-four vessels of 73,585 tons, which compares with only seventeen vessels and 17,315 tons in July, and with twenty-two vessels and 46,880 tons in August, 1902. The Clyde proportion was 69,018 tons, the Forth 1,630 tons, the Tay 1,900 tons, and the Dee 1,037 tons. The total included five twin-screw steamers, one floating dock, one sailing vessel, ten fishing vessels, two dredgers, one stern-wheeler, and two barges. As to ownership, 7,500 tons were for Holland, 1,500 tons for Spain, 500 tons for Germany, 1,950 tons for the British colonies, and all the rest for the United Kingdom. The August output makes up largely for the July short-fall, but *per contra* it reduces the amount of work left on hand. The total for the eight months in Scotch ship yards now stands at 299,340 tons, as compared with 338,700 tons in 1902, with 354,825 tons in 1901 and with 321,360 tons in 1900. It is the smallest since 1898, when the output of the eight months was 274,463 tons. The contracts booked during August aggregate about 36,000 tons of miscellaneous items including a few cargo tramps.

A further development in the turbine steam service is by the Union Steamship Co. of New Zealand, who have contracted with Wm. Denny & Bros., Dumbarton, for the construction of a turbine steamer for their service between Melbourne and Launceston, Tasmania, under a contract recently made by the company with the Commonwealth government. The vessel is to be 300 ft. in length by 43 ft. beam, and is to be capable of maintaining a sea speed of 18 knots. At this speed it will be possible to make the run between the two ports named, from wharf to wharf, in about 16 hours. The turbine steamer Queen on the English Channel service, runs a distance of only 21 miles, as against 276 miles to be performed by the Union company's new steamer. The Union company were the first to adopt mild steel in the building of mercantile steamers, their steamer the Rotomahana having been built of mild steel in 1879, and they were the first to recognize the advantages of bilge keels.

The introduction of the turbine steamer into Canada is indicated by the announcement that Messrs. Brown, McFarlane & Co. of Glasgow are making arrangements with the Canadian Pacific Railway Co. for the installation in that company's lake-boats of turbines, which will have the effect of reducing vibration to a minimum.

The fleet of the Stranraer & Larne Steamship Co. is also to be increased by a new turbine steamer, the order for which has been placed in the hands of William Denny & Bros., Dumbarton. It is expected that the new vessel will make the passage between Stranraer and Larne in considerably less time than the present steamers, and this will prove a great advantage in the conveyance of the mails. The new steamer is to be ready in time for the extra service commencing in June of next year.

A new steamer for Canadian owners has been launched by the Grangemouth & Greenock Dockyard Co. from their Greenock yard, viz: the steamer Neepawah, built to the order of the New Ontario Steamship Co., Canada. Her dimensions are: Length 253 ft. over all; breadth 40 ft.; depth 16 ft., or 24 ft. to awning deck. She is of full canal size and of fine design. Every detail has been carefully planned to meet the requirements of the package service and general cargo business on the Great Lakes. Mr. W. G. Walton, president of the company, attended the launch, and his wife named the vessel, the bottle broken over the bows being filled with water from Loch Katrine.

The occasion of the meeting of the Cunard company the other day was taken for a discussion on the question of the building of the two new 25-knot steamers. Mr. G. B. Hunter of Swan, Hunter & Wigham-Richardson, Ltd., Mr. De Rousset, that firm's designer; Mr. Andrew Laing, managing director of the Wallsend Slipway & Engineering Co., and Messrs. Charles Ellis and J. G. Dunlop, directors of John Brown & Co., Ltd., of Clydebank, all met in the board room at the Cunard offices. Mr. James Bain, general superintendent and engineer in chief of the Cunard Line was also present. The Clydebank yard will, it is understood, construct and engine one of the boats, and Swan, Hunter & Wigham-Richardson will build the other one, whose engines will be constructed by the Wallsend Slipway & Engineering Co.

The London & Glasgow Engineering & Shipbuilding Co.'s report for the year ending June 30, 1903, shows that during the year the ship building and engine works have been fully employed on contract work and repairs. The boiler works have also been well employed building boilers for other firms as well as their own contract work, and also on special work for which the company are now fully equipped. After making allowance for depreciation on buildings and machinery, the balance at the credit of profit and loss account is £39,787.3.10. The directors recommend that a dividend of 5 per cent. free of income tax, be paid, which will absorb £7,039.10, and also that a special bonus dividend of £1 per share, free of income tax, be paid, which will further absorb £23,465; that the sum of £6,000 be transferred to reserve fund; and that the balance of £3,282.13.10 be carried forward to next year's account. The directors have concluded to increase the paid-up capital of the company by £1 per share, and a call notice is issued, but they have been able to provide by the bonus dividend the funds necessary to meet the call. During the year H. M. S. Monmouth completed her steam trials, and has been handed over to the dockyard authorities. The first-class cruiser

Cumberland is now, so far as the building contract is concerned, complete, and will be made ready for sea here, instead of, as formerly, at one of the government dockyards. The first-class cruiser Roxburgh is also in a forward state. The machinery, plant and buildings have been kept in thorough repair, and the sum of £7,652.11.3 has been expended on new machinery and charged to capital account. I should add that the cruiser Cumberland on her eight hours' full power trials has just averaged 23.7 knots.

With reference to shipping and ship building prospects the chairman of the Prince Line, Ltd., at a recent meeting said that fortunately for England, she has managed up to the present to maintain to a large extent her predominant place. But the foreigners he said are seriously and earnestly laying themselves out to wrest from her more and more. Yet he did not know that they would be able to take much more of the regular line business from us. As to ship building, the position, he thought, is not so good. This country enjoyed for many years practically almost the entire ship building business of the world. Foreign countries, however, had during the last few years, steadily laid themselves out to build for themselves, and it looks as if we had now got almost to the point where some of them would entirely supply their own needs, and others were getting well advanced in the same direction. Not only would some of the most important countries, like Germany, be able to supply their own home market, but the time is proximate when they will start in the field with us in neutral markets, and perhaps the time is not far distant when they might even be in a position to share some of our own home requirements. We could not expect to enjoy monopolies for ever, and we must be prepared for competition. He referred to fair competition, and if they could not hold their own in fair competition then the fault must lie with them, and they should have to look into it and see what the fault was and set about correcting it. He referred particularly to the improper methods adopted by some countries to assist their people to wrest the trade from us. Some of these countries not only gave subsidies to their ships, but that assistance was increased largely if the vessels were built by the builders of their own country. That is a double-edged sword against this country and a very serious menace to it, because it not only injures the ship owners, but also the ship builder. As to the prospects, however, all ship owners do not share the pessimistic views above indicated.

## CANADIAN PACIFIC'S ANNUAL REPORT.

The annual report of the Canadian Pacific Railway shows \$6,454,309 increase in gross earnings and \$1,750,932 in net earnings. In his comment on the year's operations President Shaughnessy says:

"To meet the pressing requirements of settlers, many of whom came into the country during the past two years, your directors authorized the construction of a railway between Regina, on the main line, and Arcola, the present terminus of the Pipestone branch, a distance of about 113 miles; and an arrangement has been made whereby the Manitoba and Northwestern Railway will be extended an additional distance of thirty-three miles. You will be asked to approve the construction of these lines and to authorize the creation and sale of sufficient 4 per cent. consolidated debenture stock for the purpose.

"Under the authority of the resolution passed at the last annual meeting, your directors purchased from the Elder-Dempster Co. fifteen steamships, constituting that company's Canadian-Atlantic fleet, the purchase price of the vessels and of the good will of the sellers being £1,417,500 sterling. This amount has been temporarily advanced from your surplus earnings pending the issue and sale of 4 per cent. consolidated debenture stock to a like amount which you will be asked to authorize at this meeting. An unfortunate accident resulted in the loss of one of the freight steamers. The amount required in excess of the insurance to replace this vessel will, of course, be charged against revenue.

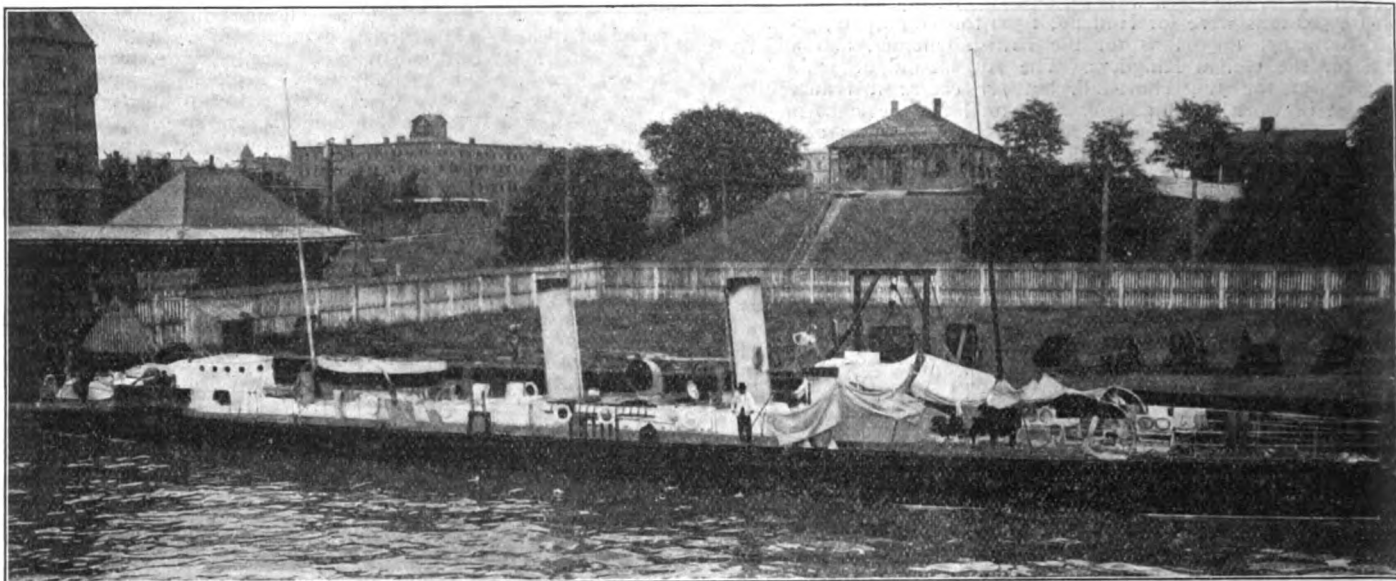
"Of the proceeds of the sale of \$19,500,000 ordinary shares, there had been expended to the end of the fiscal year \$17,228,953, and there were orders outstanding for cars and locomotives undelivered amounting to \$4,221,865. Since then additional orders have been placed to the amount of \$1,351,000, and it is proposed to continue the policy of increasing the rolling stock equipment as rapidly as circumstances will permit, until the company is well ahead of its immediate requirements. When these contracts have been filled, the proceeds of the issue of common shares, as well as the amount of \$3,000,000 appropriated from surplus earnings, will have been absorbed. The cost of cars and locomotives purchased during the last couple of years has been substantially increased, because of the necessity for getting so many of them outside of Canada, and paying the Canadian duty on their importation. In the near future, when your own shops have been completed, it is expected that you will be able to build yourselves most of the cars and locomotives required, thus saving the manufacturers' profit and the duty. Your directors will ask authority to expend \$5,000,000 during the next year on various classes of equipment in addition to all orders that have been placed up to this time. Many of the new works on which capital has been expended are being carried out on a more comprehensive scale than was originally contemplated, and the increase of nearly 50 per cent. within three years in the tonnage moved annually has made it imperative that you should, for the convenience of the public and your own financial advantage, provide forthwith many additional facilities for prompt and economic handling of traffic."



### TURBINE STEAM YACHTS.

One of the most attractive features of the international yacht races this year, says the Scientific American, was the presence of several steam yachts equipped with the latest form of motive power for marine propulsion—the steam turbine. Perhaps the most notable of these, because of her high speed, which was exhibited at the time, to the great interest of the fleet of sight-seers, was Mr. W. K. Vanderbilt, Jr.'s, rakish-looking craft Tarantula. Originally built for the late Col. McCalmont, who

The engine has shown excellent results. In a report of tests made by Prof. Denton, he says: "The economy found for the turbine is, therefore, probably quite equal at full power to that afforded by average high-speed marine triple-expansion engines and nearly the same for one-tenth of full power." The great advantage of the turbine is, of course, its small weight for the power developed, and the economy of space. The same authority states that the weight of each turbine from its throttle to the exhaust pipe flange is "8 2-3 lbs., and the space occupied one-



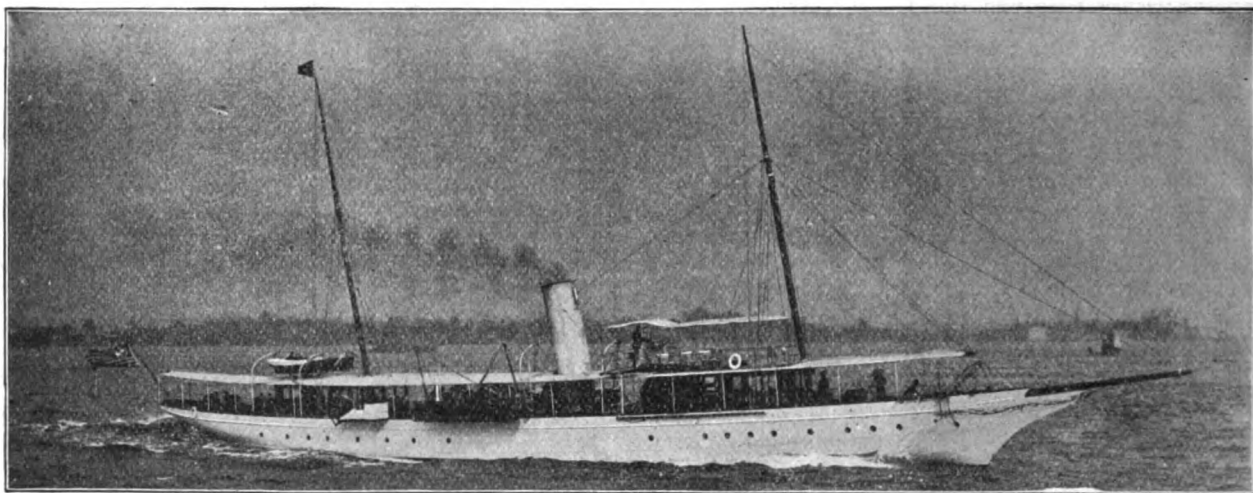
**Tarantula, 26.75 knots, owned by W. K. Vanderbilt, Jr.**

[Photo copyright, 1903, by Samuel E. Rusk, Newport News, Va.]

placed speed before every other quality in the yachts that he owned, she was subsequently purchased, through Tams, Lemoine & Crane, by her present owner, and arrived only a few weeks ago at Newport, after making an uneventful trip across the Atlantic. The Tarantula, which is built upon the conventional lines of the torpedo boat, with sharp V-sections forward, changing to flat U-sections in the after body, has a low freeboard and a comparative absence of deck-houses, and with her two funnels and two pole masts presents a very rakish appearance. She is built of steel, and measures 152.5 ft. in length, 15.3 ft. beam, and her depth is 8.4 feet. She has greatly exceeded her designed speed,

tenth of a cubic foot per indicated horse power—figures which are not approached by the average marine engine." Although the Revolution has not been designed for such high speed as the Tarantula, she is, nevertheless, a much faster boat than the average steam yacht. Her lines are handsome, and the graceful sheer, which is one of her marked characteristics, is shown to advantage in the picture of the yacht, which we publish.

The Emerald, which is now the property of Mr. George Gould, is another turbine yacht that attracted considerable attention. She is 236 ft. in length and 28 ft. 8 in. beam, and she has a molded depth of 18 ft. 6 in., and a speed of 16 knots. Her



**The Revolution, First Turbine Yacht Built in this Country.**

[From the Scientific American.]

making 26.75 knots an hour on her trial trip. Her displacement is about 150 tons. As originally constructed, she was designed to carry nine propellers, three on each shaft, but in subsequent trials three of these were removed, with the result that there was a marked increase in her speed. In the impromptu race which takes place at the conclusion of a cup contest between the steam yachts and excursion boats that witness the finish, it was remarkable to see the Tarantula thread her way through the fleet, passing such fast boats as the Corsair and Kanawah at a speed which made them look to be relatively slow vessels.

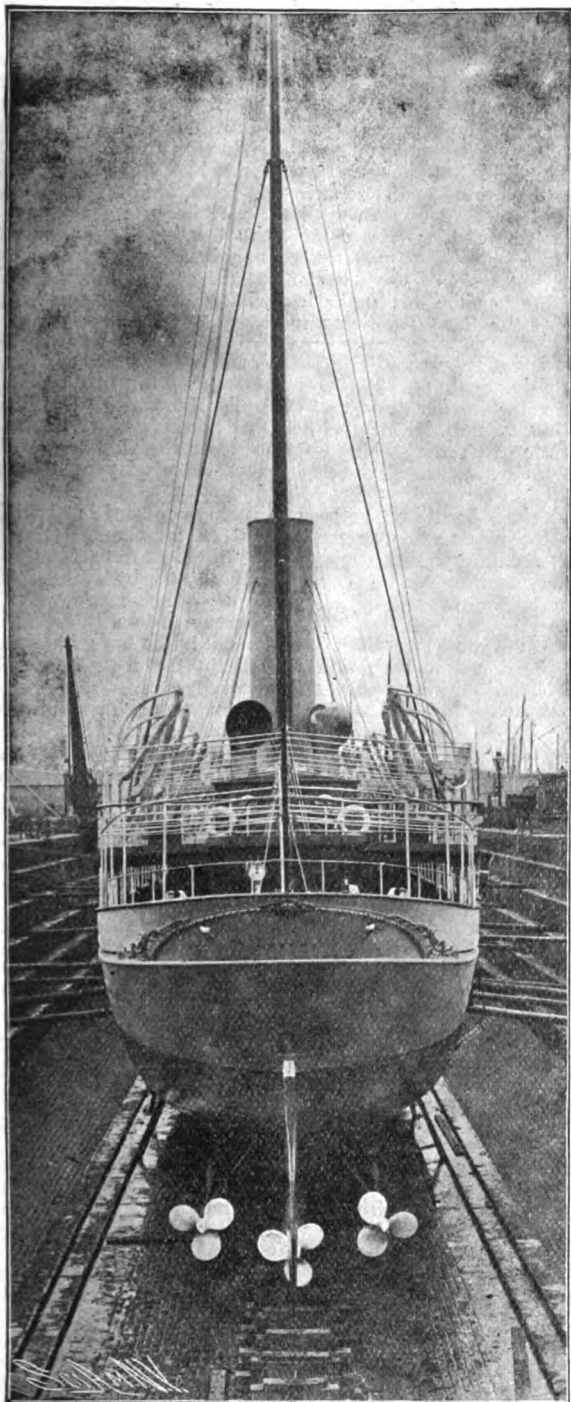
Another turbine yacht that possessed special interest for Americans at the race was the Revolution, which is the first yacht to be driven by a turbine of American make. She is 178 ft. over all, 140 ft. on the water line, 17 ft. in beam, and 7 ft. in draught. Her turbines are of the well-known Curtis type, which is now being manufactured in large units for electrical power plants.

engines, like those of the Tarantula, are of the well-known Parsons type.

Ramage & Ferguson of Leith recently completed a turbine yacht for A. L. Barbour of New York. The new vessel, which is known as the Lorena, is not only one of the latest and most luxuriously appointed yachts that have been built in Europe, but she is also one of the fastest, her speed on trial having been just under 19 knots an hour. She does not differ greatly in design or appearance from Mr. G. L. Watson's bigger boats, the most noticeable difference being that the counter is rounded off in a way that is strongly suggestive of older models. If she carried the square stern of the Watson type, she would be distinctly reminiscent of Varuna. Her length over all is 300 ft; her water line 253 ft., her molded beam 33¼ ft., and her yacht measurement close upon 1,400 tons. She carries a raised deck forward about 60 ft. in length, and there is a promenade deck ex-



tending through the vessel to within 20 ft. of her stern. This latter deck is placed about  $7\frac{1}{2}$  ft. above the main deck, on which are deck-houses that extend for a length of about 170 ft., provision being made for alleyways on both sides which are about 5 ft. in breadth. The vessel has the great advantage of compactness of the engine room which characterizes the turbine-propelled vessel. There are three turbines, one on each shaft, and two condensers. Reversing turbines are provided on each of the



Turbine Yacht Lorena, Showing the Three Propellers.

[From the Scientific American.]

outer shafts, after the system which is being followed in the recent turbine-propelled passenger vessels. Instead of carrying five propellers, as in the case of the King Edward, there are only three, or one on each shaft, as shown in the illustration. The total horse power is 3,200 indicated. The revolution of the center shaft is 530 and of the outer shafts 750 per minute. There are four cylindrical tubular boilers, fitted with Howden's forced draft, and the engines are run under a working steam pressure of 180 lbs. to the square inch. It is a remarkable fact that all the turbine yachts that are at present in commission are English-built boats sailing under the flag of American owners.

#### REAR ADMIRAL COOK RETIRES.

Rear Admiral Francis A. Cook has been placed on the retired list of the navy at his own request. Under the naval personnel act of March 3, 1899, Admiral Cook, who on the date of his retirement was a rear admiral of the junior class, will be borne on the retired list as a rear admiral of the senior class,

corresponding in rank to a major general of the army, this advancement in rank being conferred on officers who served in the civil war and had creditable records in the naval service. As he was an additional number in the grade of rear admiral his retirement does not create a vacancy or result in any promotion.

Admiral Cook was best known as the commander of the armored cruiser Brooklyn in the war with Spain. As such he served as chief of staff to Rear Admiral (then Commodore) Schley. Throughout the Schley scandal his loyalty to that officer was admired and respected by the officers of the navy, who recognized that whatever Admiral Cook's personal opinions might be, the traditions of the service required that he should not criticize the actions of a commander with whom he had been so closely associated personally. Admiral Cook did not hesitate, however, to show that he recognized the late Rear Admiral Sampson as the commander-in-chief of the North Atlantic fleet in the war with Spain and as entitled to the credit of the victory at Santiago. When the state of New Jersey presented a sword to Admiral Sampson at Trenton, Admiral Cook joined with the other captains of the West Indian war fleet in hailing Sampson as the victor over Cervera's squadron.

For a long time Admiral Cook has been in poor health. He lay at the point of death in the naval hospital here for several months last winter, and when able to be about contemplated taking a trip abroad to try the treatment at German spas. For some reason, however, he did not go. He is now in Massachusetts trying to recover health and strength. Sick leave granted him in March expired this month, and the fact that he was not able to return to active duty is regarded as the cause of his application for retirement.

Admiral Cook entered the naval academy on Sept. 20, 1860, from Massachusetts, and saw some service in the civil war. For his conduct as commander of the Brooklyn in the Spanish war he was advanced five numbers in the grade of captain. His promotion to the grade of rear admiral was made on March 21 of this year. Personally Admiral Cook is very popular in the navy, and his illness excites much sympathy among his many friends of the service.

#### INTERNATIONAL MERCANTILE MARINE INTACT.

The newspapers published a special this week from abroad that the White Star Line would withdraw from the International Mercantile Marine Co. and that the Ismay family would again take possession of it. This was surely an amazing bit of news. The first question which would naturally occur to the inquiring mind would be as to why the International Mercantile Marine Co. should desire to part with probably the most valuable fleet in its possession, certainly the one which has the greatest opportunity of making money. On the other hand the question would occur as to what manner the Ismay family would get possession of it. The consideration whereby the Ismay family and others parted with the White Star Line was cash and International Mercantile Marine shares. Would they restore the cash and the shares to Mr. Morgan? They probably couldn't if they wanted to, for it is likely that the shares have before now found their way into the market. However, before the inquiring mind had fully analyzed this latest cable the denial of it came over the wire. The only base for the story is the fact that the various Liverpool offices of the White Star and other companies embraced in the International Mercantile Marine Co. have been merged into one office.

#### ABOLISHING THE BUREAU OF EQUIPMENT.

A radical change has been proposed in the organization of the navy department. It is no less than the abolition of the bureau of equipment. For some years there has been friction between this bureau and all the others for the reasons that it is not always distinguishable where engineering ends and equipment begins. Especially is this so since electricity plays so large a part in auxiliary machinery. The bureau of equipment has always furnished the electrical equipment to the growing hostility of the engineering department and the no less concern of the bureau of construction. The purpose is to divide the work of the bureau between the bureau of construction and navigation—the bureau of navigation to take over the coaling stations. The hydrographic office which is now under the bureau of equipment is to be placed, according to the plan, into the hands of the secretary of the navy himself. It is added that the work is to be done by expert civilians. This proves that Secretary Moody is desirous of taking naval experts out of the hydrographic offices and replacing them with civilians—a purpose which, when it was spoken of some months ago, met with great opposition from hydrographic sources. It seems to be clear, however, that this is the settled purpose of Secretary Moody.

Newspaper dispatches say that torpedoes were successfully fired at three vessels of the United States navy on Saturday last by the submarine boats Adder and Moccasin, participating in the first of three torpedo boat tests to be made in connection with the naval maneuvers. The torpedo boats McKee, Stiletto and Craven were stationed off Block island, while the Adder and Moccasin, submerging about 5 miles away, attacked the presumptive defending force. Without detection dummy torpedoes were fired at each of the three torpedo boats at such close range that had the dummies been loaded the three boats would have been destroyed.



### STEEL CORPORATION VESSELS GOING TO DOCK.

An unexpected factor entered into the lake situation this week—and that is the action of the Masters & Pilots Association in virtually declaring war against the vessels of the Steel Corporation's fleet. The association had no grievance against the Steel Corporation, but it had a small one against Capt. Frank C. Rae of the steamer *Clemson* of the Provident Steamship Co., which is managed by Mr. A. B. Wolvin, who is also the general manager of the Steel Corporation's fleet of vessels on the great lakes. Capt. Rae refused to join the Masters & Pilots Association and he is also carrying his father, who is not a member of the association, as mate of the *Clemson*. He was ordered to displace his father and to employ in his stead a mate in good standing in the association. This he declined to do. Accordingly the Masters & Pilots Association began warfare against the vessels of the Pittsburgh Steamship Co., which is the corporate name of the Steel Corporation's fleet, apparently for no other reason than that Mr. Wolvin was the manager of the fleet. The mates began leaving the Steel Corporation's vessels as soon as they reached Lake Erie docks. Instead of attempting to fill their places Mr. Wolvin ordered the vessels into winter quarters. All hands were ordered to be paid off as fast as the mates quit with the exception of masters, engineers and cooks, who were instructed to put the vessels in shape for laying up. Twenty-six vessels were ordered to go to the dock in two days and others are to follow if the mates continue to quit work. The general opinion is that the Steel Corporation has practically covered the movement of all the ore that it requires and that it does not really matter to it whether its vessels remain in commission or in ordinary. From its standpoint the Masters & Pilots Association could not have made a more unwise move, as it can, under the circumstances, inflict injury upon no one but itself. The officials of the Pittsburgh Steamship Co. insist that no agreement was entered into to employ only members of the Masters & Pilots Association and that, in fact, the only agreement entered into was one respecting wages. Of course, the action of the Steel Corporation in tying up its vessels is throwing a great many men out of employment who had hoped for profitable work during the fall months. What pressure they may bring to bear to call off a fight, which really seems to be needless, remains to be seen.

The withdrawal of the Steel Corporation's tonnage, or a part of it, cannot have other than a good effect upon the freight market. So well in hand was the corporation's ore movement that several of its vessels had sought cargoes in the coal trade. This now, of course, will be abandoned. These carriers will not compete with the wild vessels. Even the laying up of the big Steel Corporation carriers for a single trip will make a substantial difference in the tonnage; but it is already certain that some of them will not come out again this season. The market was, indeed, in need of some such artificial condition as this to stiffen it. Grain shipments have been discouraging small and ore has scarcely more than kept the contract vessels busy. In point of fact the oldest inhabitant (who, however, is not very old) does not recall so strange a season for the unusual spectacle has been observed of two modern steel steamers coming down the lakes light. Both the *Saturn* and *O. M. Whitney* of the Gilchrist fleet passed down light, being unable to get cargoes either at Chicago or Escanaba. It has not been unusual for the wild carriers that got cargoes to hang around the upper lake docks for a week. However, the present attitude of the Steel Corporation is expected to give a favorable tone to the market. The ore statistician went out of business last year when from 4,000,000 to 5,000,000 more tons were moved than the most radical of them expected so that prognostications on the total movement this year are difficult to obtain. Of course no one expects that it will equal the record of last year but the movement up to Sept. 1 of this year is only 621,676 tons short of the corresponding period of last year. August shipments this year were 25,900 tons in excess of those of August of last year, which was the phenomenal month of the most phenomenal year in the ore trade. And this great August movement was handled with the utmost ease. Wild vessels moved very little of it. Contract tonnage took care of it and the enlarged facilities at the receiving docks embraced it without apparent effort. The figures of the month's shipments were a surprise to everyone. Twenty-five million is the figure which has been published as coming from fairly authoritative sources concerning the movement of this year but it is clear that there will have to be a precipitous slump during the fall months to bring the total movement down to this figure—such a slump, which it may be confidently said, is not apparent at the present time. The total movement is likely to be considerably over the twenty-five million mark.

The market is steady all round and no change in ore rates is

noted, though a little chartering was done at Marquette at 70 cents.

The grain trade continues vexatious. Cargoes are very scarce indeed and the announcement of a reduction of 1 cent in the rail rate from Buffalo to the seaboard, instead of stimulating business as it was expected to do, paralyzed it for a few days, for none of the shippers cared to ship until the rate became operative. The new rail rate obtains from Sept. 15 to Oct. 15. The new rate is, of course, expected to materially improve the American route to the sea, but some of the vessel men still contend that the Canadian route has the advantage, especially so as the operating expenses of the Canadian boats are less.

### AS BUFFALO VIEWS IT.

Buffalo, Sept. 15.—“We are not looking for much this fall,” said a vessel owner today. “There is about as little in sight, according to the size of the fleet, as there has been in a long time. We are getting along somehow and the fleet moves, but I would not be surprised to see a lot of vessels lay up very early this fall.”

Buffalo is breaking the record in shipments of hard coal, the 200,000-ton mark being reached this week for the first time, and there is no sign of letting up yet, but the big ore carriers spoiled the rates, or rather kept them from going up by going into the business and mostly taking it at a cut of 5 cents a ton. Had they not done this the rate would have been considerably higher than it is, for the moderate-sized vessels could not have met the demand. They are now coming down light for coal, which shows a very bad condition of the trade generally.

Of course there is a large amount of all sorts of freight moving, but the fleet has apparently got too large. It has been twenty years about it and was all that time just getting ready to accomplish it, but the marvelous growth of the country has kept pace with the work of the ship yards, let them do what they would. There is a new ship yard opening here. James McDougall has severed his connection with the new Empire (Gilchrist) yard and will open another just across Genesee street. The new Canadian yard down opposite Grand island is now getting well towards completion.

I find that prosperity is not always of the sort that is the best for the country. For several years the canal boatmen have been making money and this season more than the others, so that they are quite indifferent to canal enlargement, though they know that it is the inability of the railroads to carry all the grain that is keeping them in business. If the roads were grasping all the grain at a low rate, as they were till lately, there would be little for the canal to do and there would be no cry that the St. Lawrence route was taking all the grain.

Some good people are saying that the new scare is a good thing, as it shows the average business man the need we have of an enlarged canal, but it of course has no impression on the farmer, who is the chief opponent of the project. He does not want to help the cities in any way lest they run away from him still further. The vote is pretty sure for canal enlargement though.

There is an effort to shut off the Montreal route by the reduction of 1 cent a bushel on export rail grain from Buffalo, but that is hardly enough to accomplish it, as there is a rate of 3 cents against us. The canal has reduced its rate only ½ cent, which shows that there is a belief that there will be grain enough to keep the little fleet busy at that figure. With the 1,000-ton barge ready to carry grain at 1 cent a bushel—the cost is figured at only about a half cent—there would be no Canadian route possible.

This is really the first time that the Canadian route has made any inroads upon us. It would be very interesting to know just how much money has been spent by the Canadian government to accomplish this advantage. It is an advantage, too, that can be snatched away at any time, without the aid of a canal, for the roads used to carry for 2 cents the grain that they have asked 5 cents all summer for, out of this port to tide water. Of course the canal boatmen starved then and they would again if anything like it should be repeated.

Shippers of all sorts are getting uneasy over the prospect of a car shortage that will lap over any we have ever had before winter. There is every indication of it. Lumbermen report having to wait four days for a car and coal shippers are still worse off. If the water route could be made universal there would be no such state of things possible, for the boat goes anywhere and she goes where there is the best paying freight. We are glad to be borne out in our advocacy of extended waterways by recent reports from Europe, which is strengthening her canals everywhere and building more.

I am pleased to note that the ship canal heresy has been laid aside, as it was an impossibility, yet we find that the only



canal section—Rochester—that is opposing the barge canal, because of its cost, is dividing its sentiment up over ship canal notions, that would involve a cost many times that of the barge canal.

I hope that the lake vessel interest will not fail to note that the return to supremacy of our canal will mean much more business by water, as it will cut down the all-rail business, and just at a time when the roads must increase their equipment very much or leave the shipper in the lurch.

JOHN CHAMBERLIN.

#### GOVERNMENT DREDGES ON THE LAKES.

It is gratifying, indeed, to see some support accorded to the dredging interests of the great lakes which now have to fight the incubus of government competition. It is a distinct invasion of private right on the part of the engineering corps of the war department to engage in dredging. It is an unwarranted interference in private enterprise and can be justified on no grounds whatever—especially not on the ground of economy. There is no merit whatever in the argument that a combination of dredging interests exists on the lakes. One can no more make a trust out of a variety of dredging interests than he could make a trust by combining any number of chicken farms. The business does not lend itself to monopoly and capital is pretty eager to engage in anything out of which a profit may be wrung, provided it is not stopped by natural conditions. Certainly no combination of dredging interests could hope to maintain prices at an unnaturally high level because capital would then be attracted to the business. Any one can build a dredge who has a few dollars. The bringing of two government dredges to the lakes to compete with established private interests is indefensible. These private dredging interests have all they possess in the world invested in dredging plants and none of them has ever made much more than a living out of the business. In its current issue the Engineering Record discusses the subject very sensibly, saying:

"The association of dredging contractors on the great lakes, which was formed a few months ago, has been criticised severely on grounds that appear rather unjust. The fleet of dredges and auxiliary boats on the lakes is a very large one, built for the express purpose of engaging in the extensive channel deepening operations undertaken a number of years ago by the government. Many of the dredges are among the best of their type now afloat, and some of them are of unusual capacity. They represent a very large investment incurred because of the implied intention of carrying on the work by contract and without such an investment by contractors the navigation of the lakes by large vessels would not now be as easy as it is. The end of this large work is now in sight and it is only natural for the contractors not only to feel reluctant to incur heavy charges for new plant, which will probably be in good condition after all opportunity for its use has passed, but also to strive for good prices on the work still remaining. The competition has been so severe of late that several experienced firms have either failed or withdrawn. The work still remaining is rather more difficult than that undertaken before and higher prices are naturally enough desired for it. Moreover, the labor unions have made such demands that in order to carry on work at a profit even under the most favorable conditions, it is necessary to receive more money than the government has been paying. Last winter a number of contractors seriously contemplated keeping their plants idle this season on account of the labor difficulties, despite the rapid deterioration which takes place in idle dredges.

"The situation has been further complicated by the proposal to build large government dredges for this class of work. It is generally acknowledged that it is a desirable thing for the government to own and operate the small plants needed in the maintenance of the lake harbors, for little experience is required to carry on such work and few contractors will engage in it. To organize and conduct the heavy operations of channel deepening is an entirely different matter, however. It is generally considered the most difficult branch of contracting, in which only those succeed who know every feature of the work and have the judgment which comes from long experience coupled with shrewdness. The men now engaged in the great lakes work represent the survival of the fittest, in a business sense, and it is difficult to understand the position of the government in its proposal to put additional plant on the lakes, already amply supplied with dredging facilities for the heavy work still to be done. The statement that the dredge owners are now charging excessive prices is not warranted by the facts, and it is questionable if the actual cost of government work would be materially different from the expense of the same work done by contract, because of the special training necessary to carry on dredging economically.

"The association of dredge owners, about which so much has been said, has two distinct purposes. The first is to provide a central organization for handling labor questions, which are now so serious as to threaten all shipping interests on the great lakes. The second purpose is to exchange information concerning the best methods of conducting work, and to arrange for placing on each undertaking the most suitable plant for the purpose. It is only in this way that the dredge owners can see a way out of their straits, between the Scylla of the labor agitator and the Charybdis of the advocate of government dredges. It is frankly a business association, but that is no reason for calling it a trust. On the contrary, its objects seem worthy of support

so long as they are pursued in a conservative spirit. The owners of these plants, built under the supposition that the great lakes improvements would be executed by contract so long as the tenders were reasonable, have an unquestionable right to show to the secretary of war the conditions that have made higher prices necessary. In doing this they do not reflect in any way on the engineer officers of the army. All the facts that this journal has yet been able to secure go to prove that the construction of large dredges for the great lakes would be an unprofitable undertaking for the government, in addition to working injustice to a group of men whose profits have never been large and now seem about to disappear unless the association can accomplish its aims."

#### CHICAGO GRAIN REPORT.

Chicago, Sept. 16.—Since last report the number of vessels under grain charter for early loading is greater than for any similar period since opening of navigation, estimated something upward of 3,500,000 bu. The average daily receipts are running about 1,000,000 bu. and together with reduction of 1 cent per bushel in rail rates at and east of Buffalo, the proposed advances in all-rail rates for Oct. 1, with nearby material movement of northwestern grain, suggests a favorable outlook in the cash grain situation, at least as to good movement, despite the continued heavy call of vessels through up movement of coal.

Of rates, expectation seems general that present basis of 1½ cent wheat, 1 cent corn and oats for Buffalo, Port Huron and Georgian bay will be continued for a little time. To Montreal rate basis nominally 3½ cents corn (via all-water route) has the call on export business since it figures about 6½ cents to Liverpool against 8 cents to 8½ cents via New York and Boston. The grain carrying charges, lake and ocean, are at minimum basis, but, of course, there will be more or less uncertainty in movement until passing of "frost scare period" and the new corn crop position is fully assured. In the latter connection it may be noted that the September United States government crop report for 1903 suggests a total wheat yield of about 620,484,000 bu., 2,085,000,000 bu. corn and 721,000,000 bu. oats.

Of the shipments noted below for past week there was via rail about 65,000 bu. wheat, 132,000 bu. corn, 445,000 bu. oats; via lake for Buffalo 300,000 bu. wheat, 1,300,000 bu. corn and 1,400,000 bu. oats; and via lake for Canadian points about 100,000 bu. wheat, 340,000 bu. corn and 80,000 bu. oats. The shipments, lake and rail, together with stocks of grain, follow:

	Week just closed.	Last week.	Same week last year.
Wheat .....	471,865	141,215	592,288
Corn .....	2,038,014	2,199,950	675,447
Oats .....	1,850,708	853,924	1,462,255
Rye .....	1,830	.....	68,754
	4,362,417	3,195,089	2,798,744
		Shipments since Jan. 1, 1903.	Same time last year..
Wheat .....		13,759,332	23,619,894
Corn .....		58,372,276	28,643,771
Oats .....		46,540,937	39,684,016
Rye .....		325,453	1,841,220
		118,997,998	93,788,895

Stocks and grain are slightly increased over those of the preceding week.

	Week just closed	Last week.	Same week last year.
Wheat .....	6,215,000	6,303,000	7,236,000
Corn .....	5,002,000	4,230,000	1,635,000
Oats .....	3,888,000	4,347,000	2,818,000
Rye .....	435,000	428,000	186,000
	15,540,000	15,308,000	11,875,000

#### CANADIAN SHIPPING NOTES.

A 50-ft. tug boat for the Thompson Lumber Co. of Longford is being built by R. Morrill, of Parry Sound, Ont.

The Dominion government proposes to replace the present lifeboat which has been in service at Port Stanley, Ont., for twenty years with a new one.

The insurance companies have paid over \$17,500 in respect of the loss by fire of the steamer Empire State at Kingston recently. The steamer will not be rebuilt.

The Lake Ontario Steamship Co., which has been incorporated with head offices at Hamilton, Ont., and a capital of \$150,000, is the company which proposes to operate a turbine steamer between Hamilton and Toronto. The new steamer is expected to be put on the route in the spring.

The steamer Prospector has been launched at Edmonton, Alta., for Turss Bros. Her dimensions are: Length, 70 ft.; breadth, 12 ft.; depth, 4 ft. She will be fitted with a stern wheel and propelled by a 32-H. P. engine. The vessel will carry 10 tons on a draught of 12 in., and is fitted to carry a small number of passengers.

A revised chart in colors of the north end of Lake Michigan has just been issued by the United States lake survey and is now for sale by the Marine Review Pub. Co.



## IMPROVING THE ERIE CANAL.

The farmers of New York state are riding in Pullman cars to attend meetings which are held in opposition to the enlargement of the Erie canal. Who is paying the bill? The farmer is not to be blamed for riding in Pullman cars. It isn't often that he gets the chance to ride free and his native thrift would prevent him from riding when he had to pay. But who is paying the bill? Surely no merchant is putting his hand in his pocket for any such purpose. The man in the street isn't paying it. Nor is the expense incurred by whoever is contracting it for philanthropic motives or for the purpose of giving the farmer a good time. There is an ulterior motive in assembling the farmers in Pullman cars for the purpose of denouncing the enlargement of the Erie canal. There is no doubt whatever but that the railways are footing the bills. They are the only ones who have a real interest in the defeat of the proposed improvement. They imagine that the improvement of the canal will hurt the railways. In point of fact it won't hurt the railways at all, but it is useless to expect a railway man to believe that. He will go on fighting the project anyhow. Nevertheless the Review is convinced that the improvement of the canal would be a direct benefit even to the railways because it cannot see how a new and adequate avenue of transportation can do anything other than benefit a whole community. The canal will only be used for the transfer of bulk articles of freight, leaving the package business entirely to the railways, while the natural growth of every industry, stimulated by a cheap avenue of transportation, will greatly increase the business of the railway. At a recent meeting of New York state grangers, where everything was cut and dried and where the special orators were everlastingly lambasting the Erie canal project, Capt. Newell Cheney of Poland Center, a venerable granger, profoundly astonished the gathering by speaking earnestly in advocacy of the canal. He said:

"This canal saved the union; it carried free whites to the productive states of the west instead of slave labor up the Mississippi; it developed the state of New York; it produced great cities which are the real markets for the agriculturists of Chautauqua. It is the duty of the grangers to favor the adoption of any method that will result in the reduction of freight rates. The doubling of the traffic on the great lakes since 1890 shows that it is inherently cheaper to transport freight on a deepened body of water than by railroads. It is better for the grangers of Chautauqua county to make Buffalo a city of millions of inhabitants than to aid in the growth of a metropolis hundreds of miles away. Why? Because Buffalo is only 70 miles from Chautauqua, and hence a smaller portion of the farmers' products are absorbed in transportation charges. Comparatively speaking, the cost of this will be nominal. On an assessed valuation of \$6,000,000,000 it will only cost \$1.30 for interest, sinking fund and operating expenses upon every thousand dollars of assessed valuation. More and more the cities will be compelled to pay that tax. Just within recent months the state board has decreased Chautauqua county's equalization by \$8,000,000. But even if this canal should not benefit Chautauqua directly, I should still favor its enlargement as a citizen of the Empire state, and as one who participated in the war for the preservation of the union. It is the boys from the farms that conduct the great business enterprises today in the cities. Your children will in turn come to these cities in large numbers. Thus every time we aid in the development of these cities through the construction of a larger waterway, we are preparing a better field of endeavor for the boys and girls born on the farms of the state."

Gov. Odell of New York has come out distinctly and emphatically in favor of the enlargement of the Erie canal and is urging the electors to vote for the measure this fall. At a recent meeting in Buffalo he said:

"There are two questions of importance to be determined by the people before reaching a decision upon this state problem. Does there exist a necessity for the canals today? And, secondly, will the proposed expenditure add to the burdens of taxation? That there has been a steady decline in canal traffic is beyond question, and were our people to consider alone the cheapness of food products or the handling of freight from the west, we might well decide against the improvements. But commerce brings with it those agencies which are necessary for the employment of our people. In these days when competition in the business world is so pronounced, the cost of handling the raw material is one of the most important factors of trade. Whatever, therefore, can in any way reduce this cost will attract to our state manufacturing and commercial interests. It needs no words to demonstrate the fact that upon the correct solution of this question depends much of our future economic and manufacturing success."

"There are ports upon the lakes whose tonnage rivals that of many ports of the world. The prosperity of many manufacturing centers depends upon the ability possessed by them to handle cheaply the iron ore which comes from the famous mines of Minnesota. More and more the demand grows for the product of the furnace. Steel buildings have supplanted our earlier structures. Railroads need more steel and iron in the construction of cars than do the navies of the world. Everywhere are indications of growing demands which will necessitate the erection of additional furnaces and rolling mills. With them come other factors to make use of the iron products in all lines of trade. If, therefore, out of this future, New York can hold

but her share we would be justified in providing the ways and means to meet and participate in the prosperous future."

"Of course, in the treatment of this question by the state we should eliminate all consideration of a direct profit to it by reason of the operation of the canal. In a recent trip through the west, I was shown a lock on the Columbia river which had cost the federal government over \$1,000,000 to construct. Yet the tonnage which passed through it daily was so small that it could almost be disregarded as a factor. Small as it was, however, it stood not as a menace to the railroads, but served to check excessive charges or unnecessary delay, and was thus a direct benefit to every shipper along the banks of the river. So, too, in our state there can be no question that while water facilities cannot perhaps be expected to become a competitor of the railroads to the extent of material injury, yet improved waterways will certainly prevent the discrimination which foreign railroad corporations at present practice against the port of New York."

"If nothing else, therefore, comes as a result of this improvement than this, it would be better for our people as well as for the railroads which have been incorporated under the laws of our state. This solution of the question of discrimination certainly is fairer to our own corporations, because the power of the legislature to regulate charges is confined alone to those to which the state has given life. Whatever, therefore, may be accomplished upon this line alone is worthy of your consideration even if no greater tonnage should result from increased facilities upon the canal itself. Both parties pledged the submission of this proposition to the people of the state. One proposed to pay for the same by a direct tax, while the party to which I owe my allegiance, pledged itself to provide the necessary funds from other sources."

"The question which is before you for approval, or disapproval, provides that the whole cost of the improvement shall be met in eighteen years, and that for each ten millions of cost, twelve one-thousandths of a mill annual tax shall be imposed. This would make the total tax rate for this purpose under these conditions 1.212 mills. But it is proposed to extend the time of payment to fifty years by a constitutional amendment to be submitted in 1905, which if accepted, will call for an annual sinking fund of about \$4,200,000. This upon a valuation of \$6,000,000,000 would call for a tax rate of seven-tenths of a mill. In other words, upon each \$1,000 of valuation it would amount to 70 cents annually. But even this small sum will be unnecessary if the pledge for revenues from so-called indirect sources is redeemed by those who have made it a party promise. If, however, there is a well-defined opinion that this improvement is unnecessary, even this small tax should not be levied. But before reaching a conclusion you should study well every phase of the question. The legislature and the executive have performed their part of the preliminary work and it is now for you to weigh well every aspect of the case."

"Upon your decision rests the future of the canal system of this state. If this measure be disapproved it means its abandonment in the future—that is, practically so, except in so far as it be of service for a very limited use between localities under very disadvantageous conditions. It is not my purpose to endeavor to unduly influence your minds because I believe that is without my province. But in thus presenting some of the many features which are involved I trust that your attention may be directed more seriously to the consideration of this important problem. Above all, do not permit prejudice or chicanery to bias your minds, but weigh well every phase and study well the importance of the question because on your determination may depend results which are of momentous importance to the people of our state and nation."

## ERIE CANAL ESTIMATES AMPLE

In the current issue of the Railroad Gazette Mr. Edward P. North, an engineer of prominence, has an article in which he maintains that the enlargement of the Erie canal cannot be secured for \$101,000,000, but that it will cost approximately \$50,000,000 more. In the course of his article he says:

"The history of canal construction and canal improvements justify me in the prediction that the proposed barge canal will not be completed for less than \$150,000,000." In support of this assertion a comparison of the engineer's estimated costs with the actual costs in nine instances is given:

	Engineer's estimate.	Actual cost.	Percent-age of cost over engineer's estimate.
Erie canal, original.....	\$ 4,926,738	\$ 7,143,789	45
Erie canal enlargement.....	23,402,863	36,495,535	56
Cayuga-Seneca canal.....	811,188	1,306,542	61
Cayuga inlet.....	150,000	214,000	43
Oswego canal.....	227,000	565,437	149
Oswego enlargement.....	1,926,336	2,925,513	52
Crooked Lake canal.....	119,198	333,287	180
Chenango canal.....	1,960,450	2,782,124	42
Black River canal and imprv....	1,068,437	3,224,779	202
	\$34,592,210	\$54,991,006	59

The attention of Col. T. W. Symons, government engineer at present stationed at Washington, who was a member of the New York committee on canals, was directed to Mr. North's contention

and he has framed a vigorous reply. Col. Symons was instrumental in drafting the bill providing for the enlargement of the canal and he is probably better versed in the subject of canal enlargement than any man in the country.

"I have no hesitation," said Col. Symons, "in declaring that Mr. North's reasoning and deductions as to the actual cost of the Erie canal improvement are erroneous and made without a full knowledge of the facts. His main point is that the estimates of the engineers who did the work are unreliable because certain other engineering projects have been carried out at an actual cost in excess of that which was estimated. In this instance there are two good and sufficient reasons why this argument is not sound, and why the method of figuring the cost by adding a definite percentage for error based upon certain other works is fallacious.

"The first of these reasons is that these estimates were not made in the manner that the ones he refers to were reached. In all my experience I have never had to do with the making of estimates where so great liberality was shown in providing for the cost of everything which would or could enter into the construction. We had in mind at the time not only these instances which Mr. North has cited, where the actual cost had overrun the estimates, but others as well, and we were determined that in this case we would allow so wide a margin for all contingencies, to so figure labor and material at the highest possible prices that our estimates would stand and that the actual cost of the work when completed should not only not exceed the estimated cost, but be well within it. Not only did I have this in mind, but the other engineers and all who were connected with the figures were so minded, and every possible thing was provided for, all quantities were enlarged and the prices put high in order that we might discount this very criticism when it came, as it has now. So sure am I of the extreme liberality of this estimate that I would personally like to undertake the work of improvement of the Erie canal under the proposed plan, under a guarantee that I could complete it for less than the estimated cost of \$101,000,000.

"Another point that Mr. North ignores, and which is probably not as fully understood as it might be by the voters of New York, is that in the drafting of this bill we spent many months in getting up an administrative plan, which we have embodied in the bill and by which the work will be so systematized, the expenditure of the people's money so carefully checked, that it will be as effective as is humanly possible in preventing any fraud or the carrying out of pernicious practices in the execution of the work. Having been so careful in making estimates so liberally that we could stake our reputation upon their not being exceeded legitimately we devoted, as I say, months of time and thought to devising a system for the carrying out of the work, and placed provisions in the bill which will, I think, prevent these estimates from being exceeded illegitimately. We have under this bill a system which will place the work of construction on a different footing from any similar work of which I know. It is impossible for me to conceive how any fraud or diversion of funds can go on under this system. It provides that the administration shall be by a board of five engineers (of which Mr. North might be one) and the amplitude of the estimates and the method provided for the expenditure of the money is a complete answer to the charge that the canal enlargement cannot be made within the estimate.

"Of course," went on Col. Symons, "the public has come to think that it is fair to add a large percentage to the estimate for all public works of an engineering or a contracting nature. They hear more of these works where the estimates are exceeded, either through careless figuring or poor administration, than they do of those works which do not exceed the estimates. As a matter of fact, most government work is done within the estimates, and it would be quite easy to take nine other cases of such a nature and figure out a percentage which should be deducted from the estimate, thereby proving as conclusively, as Mr. North proves his contention, its very opposite, namely, that the Erie canal improvement can be made for a much less sum than called for in the bill. In this case the estimates are far more liberal than those I made for the construction of the Buffalo breakwater, which was built well within the estimated limit. The breakwater in the Delaware river, a three million dollar job, has recently been finished at about 50 per cent. of the estimate, and the jetties at the mouth of the Columbia river were built for very much less than the original figure. No government work on the lakes has exceeded the estimates, and the figures for the so-called 20-foot channel through the lakes were so ample that for much of the distance a 21-foot channel has been dredged. When it comes to talking about a possible ship canal from Buffalo to New York, the estimates are neither so careful nor so liberal. It is my judgment that even if the necessary influence could be brought to bear to induce the national government to undertake the construction of a ship canal the cost would be so great that New York's proportion would be no less than the entire cost of building the barge canal; but with this difference that New York will own and control the barge canal exclusively. There is another point, too, which has not been brought out by these ship canal advocates nor others, which is that ship canals are projected in many parts of the country, and should New York succeed in getting one it would only be at the cost of concessions which would provide for many others, and thereby create a competition for her own waterway which would divert freights that can be controlled and held by the barge canal for New York state and New York city.

"Just one word about that transshipment bugaboo at Buffalo,

which is raised as an argument against the carrying out of the barge canal improvement. I want to say most emphatically that this transshipment at Buffalo cannot be avoided by any plan whatever without diverting the freight from New York. As a matter of fact a ship canal would not prevent the breaking of bulk at Buffalo for the simple reason that the large lake vessels could not afford to navigate the Erie canal, and if a ship canal were by the Ontario route, these vessels would find it much simpler and cheaper to then cross the lake to Montreal, which would mean that the freight would not come to New York at all. You can avoid transshipment at Buffalo, it is true, but if you take that business away from Buffalo, you take away at the same time all lake business from New York. This transshipment at Buffalo is a bugaboo for another reason, which is that 90 per cent. of this transshipment at Buffalo does away with transshipment at New York. Were it possible to come through Buffalo without breaking bulk by the use of the large lake steamers in a ship canal, it would then be impossible to transfer the freight direct from these lake vessels to the ocean steamers, for the simple reason that they could not lie alongside. It would then be necessary to transfer the freight by lighters here in New York harbor, where this work is more expensive or else through elevators where the cost is higher than it is at Buffalo. A transshipment must take place at some point if the freight is coming through New York, and it can be done much more cheaply at Buffalo than at any other point. This transshipment question is not an argument against the barge canal, but distinctly an argument against a ship canal, by whose advocates it is brought forward.

"I believe in the barge canal improvement," concluded Col. Symons, "because New York must do something to retain her commerce, and she is in a unique position to utilize this waterway. It is a rare opportunity to grasp a great situation which is to extend the benefits of the cheap lake freight rates clear through to New York."

#### CONSOLIDATED LAKE SUPERIOR CO.

The minority stockholders of the Consolidated Lake Superior Co., headed by E. C. Miller & Co., W. W. Kurtz & Co., Brice Monges & Co., bankers, have started a movement to appoint a receiver for the company. They have issued a circular to the stockholders in which they say:

"The management of the Consolidated Lake Superior Co., having refused our just demands made upon them through our counsel for the names of the subscribers to the \$11,088,400 contract of subscription to the preferred stock of the company upon which the company's report of June 30, 1902, admits a balance of \$9,239,100 was then due and unpaid, and having failed also to give any reason whatsoever for not having enforced the payment of said subscriptions, it is important that immediate steps be taken for the protection of our rights as stockholders. As the best means of accomplishing the desired result it is proposed to apply for the appointment of a receiver or receivers for the corporation, this being regarded under the advice of counsel as the most effective course to pursue."

The statement asks all stockholders "who are determined to assert their rights to ascertain the true financial status of the company before accepting the proposed scheme of reorganization" to join in the movement for a receiver. The banking concerns mentioned above represent \$5,000,000 of the stock of the company. The Consolidated Lake Superior Co. is a Connecticut company and application for a receiver will have to be made in that state. The laws of the state require that no less than one-tenth of the total capitalization of the company must assent to the application before the court can receive it. The total capitalization of the company is \$102,000,000.

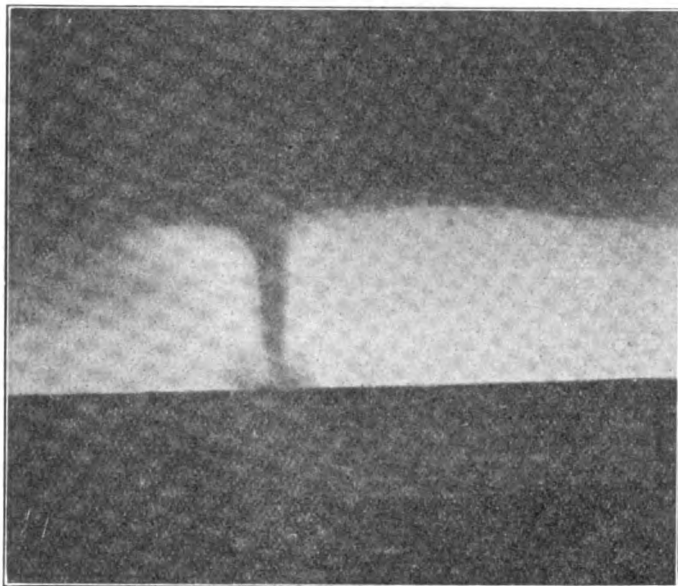
On the other hand it is maintained by the company's officials that the appointment of a receiver would be of no practical value. The company is preparing to issue a formal statement of its affairs. Some adverse criticism has been directed against it lately owing to the fact that certain of the stockholders were unable to get at the books. The books were supposed to be in Philadelphia but when they were demanded it transpired that they had been removed to Sault Ste Marie, Ont.

Mr. Elisha Greene, an old vessel man, died at the home of his son in Deckerville, Mich., on Sept. 6. He was eighty years old, having been born in Vermont on Jan. 4, 1823. He is survived by a widow and nine children. When he was nine years old his father removed to Edwardsburg, Canada, and a few years later Mr. Greene engaged in sailing on the St. Lawrence river between Montreal and Quebec. He was captain of a steamer at the early age of twenty-one and is said to have been the first man to pilot a raft over the Lachine rapids. His family consists of four boys and five girls as follows: Mrs. Samuel Bingham, Mrs. P. S. Cooke, Port Huron, Mich.; Mrs. S. C. Rutledge, Alpena, Mich.; Mrs. Henry Keil, Burchville, Mich.; Mrs. F. C. Earnst, Peoria, Ill.; Mr. B. M. Greene, Deckerville, Mich.; Mr. B. E. Greene, Creswell; Mr T. S. Greene and Mr. Malone Greene of Burchville, Mich.

The Kensington, building at the yard of the Craig Ship Building Co., Toledo, for the Kensington Transportation Co. of Bay City, Mich., is nearing completion and will be ready for her owners in a few days. The car ferry Grand Haven is also receiving her finishing touches.

### PHOTOGRAPH OF A WATER SPOUT.

Editor Marine Review: I send you a photograph of a water spout taken on Lake St. Clair Aug. 12, 1900, by a member of one of the clubs at the St. Clair flats. The water spout when first seen was about one-quarter of a mile east of the upper light on the government ship canal and traveled slowly in an easterly direction until lost to view. The photograph was taken at a distance of about half a mile. The day when this remarkable picture was taken had been very hot and sultry, with occasional



Water Spout on Lake St. Clair.

showers and no wind, and about 4 o'clock in the afternoon a whirling twisting funnel reached down from the low-hanging dark clouds and stirred the water beneath it into misty foam, which was sucked up with incredible rapidity in a whirling motion that was plainly visible.

The water spout was about 75 to 100 ft. in diameter at the base and gave forth a roar like a heavy freight train crossing a bridge. In effect it was absolutely terrifying, for all who saw it realized that nothing could withstand its tremendous power.

As the water spout (or tornado on the water) moved away from us, it seemed to grow larger in diameter and to gradually lose its rapid whirling motion and disappear in the distance. I should say it was visible to us for about half an hour.

RICHARD JOY.

Detroit, Sept. 14.

### COMMENT ON LIEUT. FAUST'S ARTICLE.

Editor Marine Review: I read with pleasure the article written by Lieut. W. H. Faust in the Marine Review, and heartily agree with him in all that he says. I was three years making up my mind whether it was necessary for me to know the different subjects Lieut. Faust mentions that a lake man should be familiar with. Finally last winter I concluded I would take a course of instruction at the Chicago nautical school, and let me say I would not be deprived of this knowledge for ten times what it cost me. I have repeatedly put in practice this summer what I mastered in theory, and can assure you it is a great source of satisfaction to know when you shape a course you are going to reach your destination whether the weather is foggy or clear. It is equally a pleasure to know how to set up a pelorus or dumb compass properly and to handle the same; and to know when you plot your position by the many methods you master that you get your exact position.

I never realized that there was so much to know about a compass until I had started in my course of instruction. My advice to all young men is that the sooner they prepare themselves for the new methods the better it will be for all concerned. It is generally known that for the past few years the local inspectors have been examining men on the new methods, such as variation, correcting courses, etc., and I should not be surprised if before long they will be examined in azimuths, amplitudes, etc., for master's papers.

WILLIAM McDONALD.

Steamer Mary Elphicke, Sept. 12.

### STEAMSHIP BONDS GOOD SECURITY.

Editor Marine Review: I have just read your article on "Building Steamers on Bonds" in the Review of the 10th inst., and compliment you on the article. It is the clearest, most concise article on the subject I have read. You have said all there is to say and made it perfectly plain to any one. You probably know that we claim to be the first in the "bonding business," which like everything else, however, is disputed. But investors

in Detroit have thought well of our vessel bonds and there are several millions of these securities held by Detroit banks, estates and investors and I believe every bond to be as good as any security on the market.

M. E. FARR,

Treasurer, Detroit Ship Building Co.

Sept. 12.

### COMMISSION ON LEVEL OF LAKES.

It is now known to a certainty that the British government will co-operate with the United States government through a joint commission to determine what is best to be done to preserve the level of the great lakes. On June 13, 1902, a rivers and harbor act approved provided as follows:

"That the president of the United States is hereby requested to invite the government of Great Britain to join in the formation of an international commission to be composed of three members from the United States and three who shall represent the interest of the Dominion of Canada, whose duty it shall be to investigate and report upon the conditions and uses of the waters adjacent to the boundary lines between the United States and Canada, including all the waters of the lakes and rivers whose natural outlet is by the River St. Lawrence to the Atlantic ocean; also, upon the maintenance and regulation of suitable levels. . . . The said commissioners shall report upon the advisability of locating a dam at the outlet of Lake Erie, with a view to determining whether such dam will benefit navigation, and, if such structure is deemed advisable, shall make recommendations to their respective governments looking to an agreement or treaty which shall provide for the construction of the same, and they shall make an estimate of the probable cost therefor."

Congressman Alexander of Buffalo has received a letter from the state department at Buffalo informing him that a message has been received from the British foreign office in which it is stated that "steps will be taken at once for the appointment of the Canadian commissioners." While no direct advices have been received it is understood that President Roosevelt is now deliberating on the personnel of the American commission.

### MEAN STAGES OF WATER.

The gage records of the United States lake survey show the following mean stages of water above mean sea level, for August, 1903:

	Stages during August,	Higher   Lower		Higher
		than during same month last year.		than during August 1895.
Lake Superior. . .	602.73 Ft.	0.40 Ft.		0.34 Ft.
Lake Michigan ....	580.28 "		0.14 Ft.	0.72 "
Lake Huron. ....	580.22 "		0.10 "	0.59 "
*Lake Erie .....	572.85 "	0.04 "	....	1.34 "

\*Reported by Cleveland office.

Present fall Lake Huron to Lake Erie, 0.14 foot less than a year ago.

### CANADIAN MERCHANT MARINE.

The department of marine of the Dominion government has just issued the list of vessels on the registry books of the Dominion corrected up to Dec. 31 last. Hitherto this list has only been published every three years and consequently has not proved of that value to the shipping interest as it might have done. The annual issue of the book will be generally welcomed. The total number of vessels on the books at that date, including old and new vessels, sailing vessels, steamers and barges, was 6,836, measuring 652,613 tons register tonnage, an increase of forty-four vessels and a decrease of 11,870 tons register over 1901. The number of steamers on the books on the same date was 2,289, with a gross tonnage of 303,353 tons. Assuming the average value to be \$30 a ton, the value of the registered tonnage in Canada on Dec. 31 last would be \$19,578,390. Following is a summary showing the number of vessels and number of tons on the books on Dec. 31, 1902:

	Sailing ships and steamers.	Steamers.	Gross tonnage steamers.	Net tonnage of sailing ships and steamers.
New Brunswick. . . . .	917	129	9,991	64,605
Nova Scotia. . . . .	2,037	172	20,530	212,967
Quebec. . . . .	1,288	363	77,860	136,660
Ontario. . . . .	1,699	1,138	125,610	156,449
P. E. Island. . . . .	156	16	3,272	13,404
British Columbia. . . . .	584	359	55,050	58,292
Manitoba. . . . .	139	97	7,030	7,530
Yukon district. . . . .	16	15	4,010	2,640
Total. . . . .	6,836	2,289	303,353	652,613

There are seventy-five ports of registry in the Dominion. Seven in New Brunswick, twenty-one in Nova Scotia, five in Quebec, thirty-six in Ontario, one in Prince Edward Island, three in British Columbia, one in Manitoba, and one in the Yukon territory. Quebec city has the largest number of vessels on its register, 654, of which 500 are sailing vessels; while Montreal has the largest tonnage, 91,347; and Toronto has the largest number



of steamers registered, 240, an increase of twenty over the figures for 1901. Thirteen ports show no steamers on the registers. The number of new vessels built and registered in the Dominion during last year was 316, measuring 30,216 tons register tonnage. Estimating the value of the new tonnage at \$45 a ton, it gives a total value of \$1,359,720 for new vessels. The new vessels were built and registered as follows:

	Vessels.	Tons.
New Brunswick .....	23	1,059
Nova Scotia .....	140	14,827
Quebec .....	36	1,990
Ontario .....	60	8,791
Prince Edward Island .....	8	530
British Columbia .....	36	2,550
Manitoba .....	10	137
Yukon district .....	3	336
	316	30,216

In point of ownership of net tonnage Canada stands eighth among the nations, those having over 100,000 tons being as follows:

British, including Canada and the colonies.....	10,475,229
United States .....	2,460,282
German .....	2,179,816
Norwegian .....	1,354,386
French .....	1,056,491
Italian .....	988,215
Russian .....	897,314
Canadian .....	652,613
Swedish .....	606,788
Spanish .....	585,449
Japanese .....	518,508
Dutch .....	482,138
Danish .....	400,911
Austrian .....	361,300
Grecian .....	360,592
Turkish .....	241,507
Brazilian .....	163,337
Belgian .....	118,015

The success of the students of the department of naval architecture at the New York nautical college—some thirty certificates having been awarded during the past year—has led the management of the college to acquire additional instruments, models, etc., to facilitate the work in each of the three courses. The training given in these courses is directly practical and assures each student a thorough working knowledge of the elemental and advanced ship calculations in relation to displacements, centers, stability, strength and propulsion; the types and methods of hull construction in wood and steel; the theoretical principles of ship design, and their actual application in the execution of a complete design which must be prepared by the student before receiving the final diploma in naval architecture. The tuition fee for each student joining the regular classes is \$50 per course, or, as a private student, \$100, and the interest of the college is also freely given to successful students who may wish to find positions as draftsmen in the ship yards of the country.

AROUND THE GREAT LAKES.

The Western Transit Co. have decided to name their new package freighter nearing completion at Chicago the Duluth. The tug Champion of Detroit, owned by H. W. Baker of that city, caught fire at Put-in-Bay on Tuesday and was destroyed.

Capt. William Greenough, an old vessel man, died at Sault Ste. Marie, Mich., this week. In the early days he was connected with the tug business.

Fire broke out on the Iron Duke at Cleveland last Saturday night and caused a slight loss before it was extinguished. The freighter is owned by Capt. James Corrigan of Cleveland.

The schooner Sandusky, recently damaged by fire, was sold by the United States marshal at Tonawanda to Miss E. B. Deubel for \$1,800. The boat will be rebuilt for the lumber trade.

Charles F. Bielman was the only bidder for the construction and operation of the new mail boat required by the post office service on the Detroit river. His bid has been sent on to Washington.

The Lorain Lumber Co. has received 12,000 ft. of oak for the government and the tug now building at Lorain will be finished. Work on the tug has been delayed for four months owing to lack of material.

The arrival of 20,000 tons of anthracite last week at Waukegan made a record for that port as a coal receiving point. The record for the largest cargo ever taken to Waukegan—4,400 tons by the City of Bangor, was broken by the Etruria with 6,000 tons of soft coal.

A special from Ottawa is to the effect that another fleet of first-class passenger steamers is to be put in service on the great lakes. The Canada-Atlantic Transit Co., now operating a freight fleet, will engage in passenger traffic between Chicago and Depot Harbor. It is understood that one arm of the service will extend into Lake Superior.

Capt. John S. McCallum, a well-known vessel master, died at his home in Detroit this week. He was thirty-nine years old and began to work for the Detroit & Cleveland Line when he was thirteen. He was the master of the steamer Western States of the Detroit & Buffalo Line but was compelled to retire three or four weeks ago owing to ill health.

Jones & Adams have leased the old Ohio dock at Duluth and will at once begin overhauling it, preparatory to putting in a large stock. The dock is located just across from the Philadelphia & Reading Co. and has been used for some time by the Great Northern. Its capacity is 125,000 tons.

There is a boom on at present in canal boat building at Tonawanda. There are now two yards in operation on Ellicott creek. The canal boat Margaret L. Whitney, built for William Whitney of Rochester, was launched last week at the yard of Edward Rose. W. H. Follette will launch a boat next week at his yard and expects to build seven more.

While excavating for the new west pier at Ashtabula the dredge encountered the wreck of the schooner Burton which went ashore nearly thirty years ago in a storm when the captain was trying to enter port. She loaded sulphur at a Canadian point consigned to Cleveland. Considerable sulphur is being brought up, but the hull seems fairly intact.

The committee appointed by the creditors of the Columbia Iron Works to formulate a plan of reorganization has reported to the creditors that it has been unable, after an examination of the company's affairs, to arrive at any practicable plan of reorganization. There appears to be nothing, therefore, left to do except to sell the plant at bankruptcy sale.

John McLearn, one of the best known engineers in Detroit, died this week. He was born in Dundee, Scotland, seventy-two years ago, but had lived in Detroit the greater part of his life. He was one of the builders of the dry dock at the foot of Orleans street when the plant was operated by Campbell & Owen. Later he took to sailing and towing. He is survived by four children—Mrs. Charles R. Joyce, William E. McLearn, Alfred B. McLearn and Miss Jessie F. McLearn.

For some time past the respective owners of the steamboat Frank E. Kirby and Columbia have claimed their steamer to be the fastest. A private race was therefore run on the Detroit river this week from Detroit to the Lime Kiln crossing with the result that the Kirby won the race by over half a mile. The Columbia had the best of it for 9 miles, but a slight derangement then occurred in the forced draft equipment and she was compelled to make the balance of the race under natural draft.

During the week two lake freighters were launched—the R. E. Schuck, belonging to the Gilchrist fleet at the Lorain yard and the P. P. Miller, belonging to the Miller Steamship Co., at the Buffalo yard of the American Ship Building Co. The Schuck is 436 ft. long, 50 ft. beam and 28 ft. deep; the Miller is 375 ft. long, 48 ft. beam and 28 ft. deep. The Miller will be towed to Cleveland to have her machinery installed. When she enters service a month hence she will be under the command of Capt. William Clark.

The steamer John Craig, which was advertised to be sold at public auction at Detroit last week, was not sold. The auction conducted by the underwriters was under way and \$18,100 was bid by Capt. James Davidson of West Bay city and nobody would go higher. The underwriters therefore decided to call off the sale and readvertise. Mr. F. S. Masten of the firm of Goulder, Holding & Masten filed a libel against the steamer in behalf of the Great Lakes Towing Co. for a wrecking bill aggregating \$32,000. The vessel will now be sold at marshal's sale.

The schooner Moonlight, belonging to the Gilchrist fleet, foundered 12 miles off Michigan island in Sunday's great gale on Lake Superior. The crew were taken off with the greatest difficulty by the steamer Volunteer, which had the Moonlight in tow. The Moonlight was for many years the crack sailing ship on the great lakes. She came out in 1874, and was among the largest vessels of her class, being 205 ft. long and 33 ft. beam. After sailing the lakes for many years the Moonlight was bought by J. C. Gilchrist two years ago, and converted into a tow barge. She was insured for \$9,000.

Last week the Great Lakes Towing Co. laid off a night crew of one of the tugs owing to the fact that it had no business for it. The men claimed that the action was in violation of the contract made last spring, President McDonough of the local union maintaining that the understanding was that the men were to be employed all season. President Couly of the Great Lakes Towing Co. maintained that there was nothing in the contract requiring the company to keep more tugs in commission than were necessary. However, Capt. Charles McCarle, grand president of the Licensed Tugmen's Protective Association, was called to Cleveland from Chicago and the affair was settled by permitting the night crew to alternate with the day crew.

Final payment of the \$1,500,000 bonus has been made to the fee owners of the Negaunee mine by the Cleveland-Cliffs Iron Co. and on Sept. 3 the property passed into the hands of that company. The Negaunee has an interesting history. Twenty years ago a lease was made by Mitchell, Maas & Longstorf, to the Cleveland Rolling Mill Co., at a royalty of 25 cents a ton. Five years ago this company sold this lease for a bonus of \$650,000 to the American Steel & Wire Co. Before the organization of the United States Steel Corporation, the property was in bad shape, and many thousands of dollars were spent for repairs. On Jan. 7, 1902, the mine caved in, a number of men were buried and the old shaft was ruined. The second shaft was then under way, and the property was quickly put into condition, and has since been a large producer. The Oliver Iron Mining Co. operated the property until a year ago, when a lease was given on a basis of a bonus of \$1,500,000, and a 30-cent royalty to the Cleveland-Cliffs Iron Co.

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## THE MILITARY IMPORTANCE OF NAVAL ENGINEERING EXPERIMENTS.\*

REAR ADMIRAL GEORGE W. MELVILLE, U. S. N.

The act making appropriations for the naval service for the fiscal year commencing July 1, 1903, contained a larger appropriation for new construction than any act heretofore passed by a congress of the United States. This act not only provided for the construction of three first-class battleships of not more than 16,000 tons, and two first-class battleships of not more than 13,000 tons displacement, but it likewise authorized the building of a naval engineering laboratory whose cost, including equipment, should not exceed \$400,000.

The hulls and machinery of these five battleships will cost approximately \$20,000,000. The armor, armament and equipment will require an additional outlay of \$15,000,000; so that the actual cost of these battleships will probably be about \$7,000,000 each. The annual depreciation of each of these vessels from the time they are launched, taking into consideration wear and tear as well as loss in fighting value, will be at least four per cent. of their actual cost. The expense attending the establishment of the proposed experimental station, including its operation for several years, will thus be but little more than the annual loss resulting from corrosion, mishaps, and depreciation of military appliances of two of these floating fighting machines.

The rise of Germany as a naval and maritime power during the past thirty years has surprised the world. I believe that her battleships for their tonnage are the best afloat, because they possess a triple screw installation of machinery, thus giving the motive power of her larger warships economical, structural, and tactical advantages over similar high-powered vessels of rival nations. Her ocean greyhounds are the largest, fleetest, and probably the most economical and comfortable afloat. Strangest of all, this excellence in the construction of warships, as well as in the building of vessels for the ocean-going trade, is not the result of a progressive series of failures, either in design, construction, or of operation.

The success of Germany can be accounted for only by recognizing the fact that study, reflection, and research must have been expended in the preparation of plans, in the building up and the organization of the ship yards, and in laying out and carrying on the work of construction. It was the high appreciation of the value of original investigation, coupled with experimental work, that has caused Germany to advance progressively and successfully. Patient investigation and carefully conducted experiments were required by the Berlin admiralty, for these officials believed that unless such research was thoroughly conducted, the building up of any navy and its mercantile marine could be accomplished only after discouragement and possibly disaster had been encountered. Where research had not been conducted, disappointment resulted from the construction of vessels which were either faulty in design, ill suited for the purpose intended, or upon which an inferior quality of work had been expended.

For over a hundred years Germany, as a nation, has carried on more original research along technical lines than any other power. While it is true that both England and America have put to practical application the principles discovered by German research, thereby gaining commercial and maritime advantages, it has been the Teuton who has sought after principles, and thus the world is primarily indebted to this studious and thoughtful race for many of the great discoveries and inventions.

In a desultory and sporadic manner all naval powers have done some experimental work. It is because original investigation is not always appreciated in its fullness by the Anglo-Saxon that many administrative executive officers are indifferent to such research, and therefore experimental tests in Great Britain and America are not always of a continuing nature. Great Britain however, has recently been compelled to establish a national physical laboratory, because the encroachment of continental rivals threatened to interfere with her foreign markets. It can hardly be said that she has done this work in a manner that should be duplicated by us; since it has been affirmed that in this laboratory the standard measuring machines are installed in a basement room, the walls and ceilings of which are of rough brick, full of deep crevices in which dust can, and will, of course, collect. Better do no scientific work than not do it well, is the maxim of the German.

Thirty-five years ago Engineer in Chief B. F. Isherwood, United States navy, carried on an extended and careful series of experiments in connection with the subject of screw propellers. The information secured at that time is standard authority to-day; but since then it has required persistent effort to arouse naval administrators to the importance of detailing ships and men for securing data upon questions relating to the action of the screw propeller.

The problem as to whether or not in-turning screws are detrimental to maneuvering qualities would have been solved many years ago if the work planned by Mr. Isherwood had been continued. Our increased knowledge of the theory and practice of screw propulsion since the Isherwood experiments is due, however, almost wholly to the work of Froude, conducted for the British admiralty. This is confirmatory evidence that such important and difficult work can only be undertaken by official or

\*Read before Engineers' Club in Philadelphia.

civilian experts who are able to call upon government resources for data and information. It requires government investigation to solve important problems relating to the powering of vessels, since valuable and far-reaching experiments upon this subject require the use of ships as well as the services of a large number of reliable and competent persons to collect the data requisite for the determination of absolute results.

### EXPERIMENTAL WORK DONE AT THE NAVAL ACADEMY.

With a thorough realization of the importance and necessity of securing data upon screw-propeller problems, the head of the steam engineering department of the United States naval academy, Rear Admiral C. W. Rea, new engineer in chief of the United States navy, assisted by the instructors in his department, commenced in 1895 what promised in some respects to be an extended investigation of the problem. These tests were interrupted by the demands of the Spanish-American war, since everything at the naval academy had at that time to be subordinated to hastening the graduation of the senior classmen.

The plant consisted of a small, triple-expansion engine, turning a shaft upon which was fixed a propeller submerged in a tank of water. This tank was so arranged that the column of water driven forward or back, depending upon the direction of motion of the engine, returned on the opposite side of the tank to the propeller. Between the engine and the tank two dynamometers were placed on the shaft—a direct thrust and a rotary one. Upon a rigidly fixed table, placed over these dynamometers, was attached a recording instrument specially designed by the head of the department of steam engineering. From this simple and yet reliable installation the power developed in the cylinders and that exerted by the propeller could be compared. By noting the thrust upon both the rotary and the thrust dynamometers the power expended in frictional resistance could be ascertained, it being represented by the difference in the pressures recorded.

The scope of the experiments embraced the working of propellers of different designs, as regards pitch, area, shape and number of the blades. Thus it was possible to secure absolute comparative data as to the power required to operate the different propellers at varying speed. It was also proposed to test the same propellers under different conditions of immersion—which would be from as deep an immersion as the tank would permit to a condition where the blades would be partly out of water.

When Prof. Biles, the eminent British naval architect and marine engineer, visited the academy in 1896, he expressed surprise and satisfaction at finding an installation whose cost was so slight and yet whose capabilities were so vast in securing reliable data upon this important subject.

The head of the department of steam engineering at the naval academy at that time had practically but a few hundred dollars as a contingent fund, but with the aid of the machine shop resources and the inventive genius of his staff of assistants, he showed the character of the original experiments that may be conducted when a well-established laboratory is in operation under intelligent and scientific supervision.

Many more illustrations could be given as to the manner in which important experiments have been discontinued from both necessary and unnecessary causes. It is methodical, thoughtful, and persistent work which counts, and as the German excels in this respect, the engineering world is now beginning to understand in its fullness the value of the work done at the German engineering laboratories in promoting German success in both naval construction and maritime development.

### GERMANY APPRECIATIVE OF SCIENTIFIC RESEARCH.

It is an anomaly that the greatest of military nations should be the first to appreciate the scientific attainments and capabilities of the engineer, and it is for this reason that Germany has a start of at least five years over England, France and America in systematic naval engineering research. In all probability each of the three other nations has spent more money than Germany in experimental work, but German expenditure, in great part, has taken place before the article is manufactured or the ship is laid down, while in the case of some rival powers, tests and experiments have been conducted to discover means of overcoming avoidable defects.

The proverbs that "an ounce of prevention is worth a pound of cure" and that "a stitch in time saves nine" are as applicable today as they were in the last century. It is for this reason that the preparatory experimental work conducted by Germany has been productive of greater results than that done by rival powers working in the direction of seeking remedies for existing evils.

The cost to the British government of using the cruiser Hyacinth, Minerva, and Hermes for comparative boiler tests and experiments will approximate more than the cost of establishing and operating both the Charlottenburg and the Dresden stations since their inception. In our navy it had been suggested to effect a change from in-turning to out-turning propellers of all the battleships and large cruisers in course of construction, without

even carrying on a system of comparative tests to find out whether or not the change is desirable. It is illustrations of this character that should cause experts to take an inventory of naval strength by conducting comparative experiments, and thus testing the endurance, efficiency, and fighting value of the expensive floating machines that are commonly termed battleships.

If it be true that the battleship of one generation is the junk-heap of the next, then an economical race like the German is pursuing a wise policy in conducting experimental research and investigation in the direction of finding out how the weak links in the naval chain can be strengthened. In the race for naval supremacy it is bullion, as well as brains, that counts. As the financial budget of Germany may not be so satisfactory as that of England or America, it is imperative upon the part of the admiralty in Berlin to take good care, even from a financial standpoint alone, that no mistakes shall be made in naval construction.

Experience has shown that the German engineering laboratories are more than a good paying investment, for there is not an expert in that empire familiar with the work being done at these laboratories who does not believe that their destruction would be a greater national calamity to the navy and the nation than the loss of one of the battleships of the home squadron. The warship could be replaced in four years. It would take six years to rebuild and put in effective operation the complete installation for conducting experimental research that has been developed and perfected at the Charlottenburg and Dresden technical colleges.

There is probably not an eminent naval or mechanical engineer in America or England who has given consideration to this question who is not also of the opinion that the establishment of a national experimental laboratory for naval purposes will vastly contribute to military strength. Probably the majority of these experts also believe that such an institution would eventually contribute more to actual naval strength than the building of a battleship. One does not need to possess vivid imagination to realize that much is contributed to the fighting strength of a navy by carrying on research along engineering lines, and thus preventing the design, construction, and installation of appliances that are ill suited for the purposes intended.

#### SPECIAL ENGINEERING FEATURE PROJECTED.

In the preparation of the tentative plans for both the equipment and the operation of the laboratory, it has been deemed wise to thoroughly inquire as to what has already been done both at home and abroad. Through correspondence and official visits, the equipment of the leading American institutions has been inquired into. From diploma graduates, as well as from other sources, the bureau has received valuable information as to the character of the research that is being conducted at the European technical colleges.

The bureau is particularly indebted to President Henry S. Pritchett, of the Massachusetts Institute of Technology, for a copy of the report of Prof. Edward F. Miller, of that institution. This technical expert of the faculty had been commissioned by the president and corporation of the institute to visit the most important technical schools of England, Germany, Switzerland, and France, in order to report upon their methods of technical instruction and upon the laboratory equipment.

Of late there has been a great scarcity of naval engineering experts available for detail to special duty, and as it was not compatible with public interests to assign an officer to visit the engineering institutions of Europe, the report of Prof. Miller is exceedingly opportune. In some respects it covers the field of information desired by the bureau as to the development of the purely engineering laboratory on the continent.

In collaborating the information received from various sources, the bureau is of the opinion that the laboratory at Annapolis should in many essential respects be patterned after the Charlottenburg school along steam and material-testing lines; after that of Dresden as respects gas-furnace installations and hydraulic appliances; and after the Swiss school at Zurich in the equipment of apparatus for testing that class of turbines which work under low heads. As for the character of the laboratory building and its furnishing, the technical college at Liverpool should serve as a model, since the building of this institution is an ideal one in many respects, especially as regards light and ventilation.

As there is a growing tendency upon the part of all the technical laboratories, both at home and abroad, to encourage research work and to teach engineering methods and practices, there should be little time wasted, in encouraging either faculty or students received for instruction, in the effort to acquire manual skill in the operation of tools and appliances, since such work should be the sphere of the manual training school rather than that of a research laboratory.

The museum of the laboratory should contain applications of all the different mechanical movements; every form of quick-return motion; models of various systems of valve gear and linkages; special sets of Reuleaux models, elements of the principal forms of marine boilers, and various designs of steam turbines. In all probability the success of the steam turbine in the future will be a development of a combination of features of several designs rather than the improvement of any one type, and, therefore, special prominence should be given to this subject.

As the success of the laboratory as a whole must be the primary aim, it should be the director of the experimental station,

working under the supervision of the bureau chiefs, and not the individual heads of special departments, who should determine the character of the work to be done at the laboratory. Probably the special weakness of the German laboratory organization rests in the fact that each particular branch of research work is under a separate head, where every professor in charge is absolutely supreme in his own department. As a consequence, that branch of the laboratory is most developed which has the ablest staff. Such an organization of faculty leads to jealousies among the members, and thus prevents the advancement of the general research work and scientific investigation.

#### INFLUENCE OF THE GERMAN TECHNICAL LABORATORIES.

While the experiments conducted at the Charlottenburg, Dresden, and Zurich laboratories relate chiefly to improvements in machine design and to the study of the practical application of the principles of kinematics, the work of these institutions has indirectly had a very important bearing upon matters relating to marine engineering. The primary purpose of these laboratories is to give students an opportunity to analyze and report upon the operations of various kinds of machines, pumps, compressors, motors, and engines. Experiments and tests are likewise conducted for cheapening the manufacture and improving the character of commercial appliances, particularly in the direction of manufacturing articles that will find a sale in foreign markets.

The more one studies the work done at the German technical laboratories, the more impressed he becomes with the thoroughness and patience that characterize such research. The attention to details, and the conscientious effort to secure absolute information and not to sustain theories, have proved a direct benefit to the extension of the German mercantile marine, by reason of the fact that many German naval architects and marine engineers have received training and instruction in these laboratories. Men who receive such training become imbued with the necessity and importance of carrying on comparative experiments in an intelligent, conscientious, and scientific manner.

Every national engineering laboratory should set the pace for technical experimental work, and, therefore, one does not need to possess gifts of prophecy to predict that the engineering laboratory at Annapolis will rapidly develop into an institution that will improve the character of our naval construction, if not advance the extension of our merchant marine.

In 1895 a bill was introduced in the congress providing for the building and equipment of a naval engineering experimental laboratory at the New London naval station. There were many reasons for locating the experimental station in that vicinity, and this site is today the superior one in many respects. When there was a separate corps of naval engineers, however, there were special advantages in having an engineering laboratory located, like that of the war college, at a place entirely distinct from the naval academy. With the amalgamation of the duties of the line and engineer officers, Annapolis became the logical place for the establishment of the enterprise, although it is the most ill-suited of all locations if the academic authorities do not welcome its coming.

For the past eight years, therefore, the bureau of steam engineering of the navy department has had in contemplation the establishment of such an experimental plant. The scarcity of officers during the Spanish-American war, and for several years following that event, made it impracticable to urge the measure; but during the intervening time the bureau of steam engineering has made persistent efforts to collect all possible information relating to the subject.

#### CO-OPERATION OF BUREAU OF NAVIGATION SECURED.

About three years ago the question was carefully considered by Admiral A. S. Crowninshield, and the bureau of navigation was induced to cheerfully co-operate in a renewed effort to have the station authorized by the congress. Both Secretaries Long and Moody approved the proposition in its entirety. The measure only failed to become incorporated in a previous appropriation bill by reason of the fact that the amendment of the senate, authorizing its establishment, was stricken out by the naval conferees, clearly upon a misunderstanding as to the purpose and necessity for such a laboratory in a modern navy.

It takes time, energy, and money to develop such an institution, and therefore the resulting benefits can only be observed after such a laboratory has been in operation for a considerable period. The advance of Germany in naval engineering research will be much more apparent during the next few years than it is now, and it was in recognition of this fact that the fifty-seventh congress was induced to authorize the building of such a laboratory for the American navy. It will be years, however, before the full value of the laboratory may be made manifest to the service at large.

It can be absolutely stated that the navy is behind the times in original work and research. Several months ago one of the marine superintendents of one of the great lakes transportation companies told me that if he were called upon to retrench in expenditures the last item to be cut down would be that for experimental purposes, since both the cost of construction and the expense of operation of the steamers under his control had been reduced as a result of the data secured from experimental work. There is not a leading university, large manufacturing concern, or great transportation company that does not consider it imperative to make tests and experiments. Every navy will also find that it will increase efficiency and promote economy to



conduct and to encourage extended investigation of unsolved problems relating to its marine service.

Unless its industrial leaders have acquired a technical and scientific educational foundation, no nation can secure marked advance either in the field of manufactures or in naval construction. The welfare of the technical high schools and scientific laboratories is likewise dependent upon industrial prosperity, for in times of financial depression there is a tendency to minimize research and investigation. Now that there is a strong sentiment in favor of carrying on naval research, the work should be pushed so that results can be accomplished which will show its imperative necessity to naval development.

A few dollars spent in well-directed and conscientious experiments may result in the saving of hundreds of dollars elsewhere. The cost of maintaining a battleship in commission will approximate \$1,000 per day, and warships have been tied up for weeks on account of the corrosion of a few hundred dollars' worth of boiler tubes. It will repay the nation for the cost of an experimental station if the staff of the laboratory will simply cause increased length of life of both boiler and condenser tubes.

#### NAVAL ENGINEERING PROBLEMS TO BE SOLVED.

The field to be covered by experimental research along engineering lines is vast. The following are only a few of many urgent problems in the solution of which the navy has a direct interest:

1. The value of liquid fuel for various naval purposes.
2. The possibilities of the steam turbine for installation in warships.
3. Efficiency of various forms of propellers.
4. The relative advantages and disadvantages of in-turning and out-turning screws.
5. The reduction of vibration of machinery.
6. Limits of economical increase of steam pressure.
7. The development of practical appliances for utilizing the advantages of superheated steam.
8. A proper ratio of sizes of cylinders for multiple-expansion engines.
9. Improved systems of economy in auxiliary machinery of naval vessels.
10. The value of condensed fuel, such as briquettes, etc.
11. The relative advantages of straight and of bent-tube types of boilers for torpedo boats, gunboats, cruisers, and battleships.
12. The corrosion and deterioration of boiler and condenser tubes.
13. The relative value of various alloys for machinery purposes.
14. The types of valve gear most suitable for naval purposes.
15. The endurance of the storage battery and its possible development.
16. The more extensive use of steel castings.
17. The question of lubricants.
18. Calibration of gauges and of instruments necessary for naval engineering purposes.
19. The proportions of centrifugal fans.
20. The most effective systems of forced draft for various classes of warships.
21. Mechanical refrigeration, the present method of cooling magazines being far from satisfactory.
22. Testing non-conducting and fire-proofing materials.
23. The determination by actual test of the best proportions of important engine details.
24. The study of the problem of how to secure more complete and definite information upon trial trips.
25. Reliable form of water-glass gauge that will be applicable for forced-draft conditions as well as when muddy feed water is used.

#### BOND CONVERSION SYNDICATE CALLS FOR CASH.

A call for \$5,000,000 in cash has been made on the members by the managers of the United States steel bond conversion syndicate. This is considered additional proof that the plan which was fought in the courts for nine months has failed and that the syndicate has sustained a heavy loss. In the spring of 1902 the bond conversion plan of the United States Steel Corporation was put out. It provided for issuing \$250,000,000 5 per cent. second mortgage bonds for the retirement of \$200,000,000 7 per cent. preferred stock and raising \$50,000,000 additional working capital for the corporation and its subsidiary companies. The stockholders received two options—first, to exchange pro rata at par \$200,000,000 preferred stock for new bonds, and, second, to subscribe in cash at par for \$50,000,000 new bonds. An underwriting syndicate agreed to take at least \$100,000,000 of the bonds not taken by stockholders in exchange for \$80,000,000 preferred stock and \$20,000,000 in cash. For this service the syndicate was to receive a cash commission of 4 per cent. on all bonds issued. This syndicate is composed of principal stockholders of the corporation.

Considerable mystery has surrounded the operations of the syndicate, and it has been impossible to get any of the managers to tell anything about its affairs; but it has been no secret that the syndicate has been greatly disappointed at the failure of the stockholders generally to convert their holdings into bonds. It is commonly reported that the public converted only about \$50,000,000 preferred stock and furnished \$10,000,000 cash, or one-fifth of the entire amount. It is not known whether stockholders' offers of conversion are included in this total, but it has been

accepted that not more than \$120,000,000 preferred stock was converted and \$30,000,000 cash furnished. Assuming this to be true, it is interesting to figure the syndicate's losses to date. The syndicate put up \$80,000,000 of preferred stock, worth at the market 94. This was converted into bonds. These bonds sold yesterday at about 78. This is a loss of sixteen points, and on \$80,000,000 would cause a loss of \$12,800,000. In addition the syndicate must furnish \$20,000,000 cash to buy a similar amount of bonds at par, which would add another loss of \$4,400,000, or a total of \$17,200,000. From this should be deducted the cash commission of 4 per cent. on \$150,000,000, or \$6,000,000, leaving a net loss of \$11,200,000. The syndicate however, probably made money from its operations in the market, so the actual loss to date may be set down at \$10,000,000, as was estimated at the time the bond conversion scheme was declared legal. As it was generally supposed the syndicate had paid in all its cash obligations Wall street was surprised at the call for cash. Whether this \$5,000,000 included the total liabilities of the syndicate could not be learned.

#### SUMMARY OF NAVAL CONSTRUCTION.

In the constructive race between the battleship Louisiana, building at the Newport News yard, and the Connecticut, building at the New York navy yard, the lead continues with the Newport News Company. The Louisiana is 21 per cent. completed as against 15 per cent. for the Connecticut. Following is the summary of naval construction:

Name.	Building at	Degree of completion.	
		Per Cent.	
		Aug. 1.	Sept. 1.
<b>Battleships.</b>			
Missouri .....	Newport News Co.	96	97
Ohio .....	Union Iron Works.	80	81
Virginia .....	Newport News Co.	40	42
Nebraska .....	Moran Bros. Co.	22	23
Georgia .....	Bath Iron Works.	33	33
New Jersey .....	Fore River S. & E. Co.	41	43
Rhode Island ....	Fore River S. & E. Co.	41	44
Connecticut .....	Navy Yard, New York.	13	13
Louisiana .....	Newport News Co.	19	21
Vermont .....	Fore River S. & E. Co.	0	0
Kansas .....	New York S. B. Co.	0	0
Minnesota .....	Newport News Co.	0	1
<b>Armored Cruisers.</b>			
Pennsylvania ....	Cramp and Sons.	54	57
West Virginia ...	Newport News Co.	55	57
California .....	Union Iron Works.	37	39
Colorado .....	Cramp and Sons.	58	60
Maryland .....	Newport News Co.	54	55
South Dakota ....	Union Iron Works.	33	33
Tennessee .....	Cramp and Sons.	3	3
Washington .....	New York S. B. Co.	2	2
<b>Protected Cruisers.</b>			
Denver .....	Neafie & Levy	95	95
Des Moines .....	Fore River S. & E. Co.	90	90
Chattanooga ....	Lewis Nixon	74	76
Galveston .....	Wm. R. Trigg Co.	67	67
Tacoma .....	Union Iron Works	83	83
Cleveland .....	Bath Iron Works	98	99
St. Louis .....	Neafie & Levy	23	23
Milwaukee .....	Union Iron Works	27	27
Charleston .....	Newport News Co.	46	46
<b>Gun Boats.</b>			
Dubuque .....	Gas Engine & Power Co.	0	0
Paducah .....	Gas Engine & Power Co.	0	0
<b>Training Ships.</b>			
Cumberland .....	Navy Yard, Boston	0	0
Intrepid .....	Navy Yard, Mare Island	0	0
<b>Training Brig.</b>			
Boxer .....	Navy Yard, Portsmouth, N. H.	1	1
<b>Torpedo Boats.</b>			
Stringham .....	Harlan & Hollingsworth	95	95
Goldsbrough ....	Wolfe & Zwicker	99	99
Blakely .....	Geo. Lawley & Son	99	99
Nicholson .....	Lewis Nixon	99	99
O'Brien .....	Lewis Nixon	98	98
Tingey .....	Columbia Iron Works	96	96
<b>Steel Tugs.</b>			
Sotoyomo .....	Navy Yard, Boston	83	83
Pentucket .....	Navy Yard, Mare Island	55	55

Rear Admiral Bowles, the chief constructor of the navy has recommended that congress be asked to appropriate money for two scout ships of 1,200 tons, to be fitted with turbine engines capable of producing a speed of 30 knots. This recommendation is now being considered by the board on construction which recently adopted a suggestion of Rear Admiral Melvi then engineer in chief, that the building of two scout ships 5,000 tons be urged.

Signor Marconi has just signed a contract with the British admiralty for the use of his system of wireless telegraphy on the ships of the British navy.

VIGILANT REGULATORS ON LAKE VESSELS.

The Vigilant feed water regulator has been adopted by several steamship companies on the great lakes. It is represented for this regulator that it makes perfect water level a continual certainty, that it will work under all pressures and that temperature or location has no effect on its operation. The following is a partial list of companies and steamers using the Vigilant feed water regulator on the great lakes: Pittsburgh Steamship Co.—Steamers Gen. Orlando M. Poe, Samuel B. F. Morse, John W. Gates, James J. Hill, Isaac L. Elwood, William Edenborn and Alexander McDougall; Provident Steamship Co.—Steamers James H. Hoyt, D. G. Kerr, James B. Reed and D. M. Clemson; Peavey Steamship Co.—Steamers Frank H. Peavey, Frederick B. Wells, Frank I. Heffelfinger and George W. Peavey; Great Lakes Towing Co.—Tug Charles F. Dunbar; Graham & Morton Transit Co.—Steamer Puritan; Dunkley-Williams Co.—Steamer City of South Haven; Great Lakes & St. Lawrence Nav. Co.—Steamer George C. Howe; West Superior Ship Building Co.—Tug Islay. Other vessels are now being fitted with the Vigilant regulator. Mr. F. P. Hamilton, the contracting sales agent with offices in Atwater building, Cleveland, has just closed contract with the Buffalo fire department to equip three fire boats with the Vigilant at once.

The battleship Maine will leave the Cramp yard on Friday of this week on a very important trip. With her boilers overhauled and her gun mounts strengthened she will proceed to sea for a firing test of her repaired battery. She will then go to Newport News where she will be docked and her bottom cleaned. With her bunkers full her propellers will be standardized over the Barron island course, and not later than Oct. 10 she will leave for an endurance run at full speed to Culebra island near Porto Rico, and return. This test will be watched with the greatest interest by the navy department, as the bureau of construction has determined to await its outcome before assuming any formal attitude on the Niclausse boilers which are now being installed in the Missouri and Ohio and other warships.

An interlocutory decree has been handed down in the United States circuit court at Portland, Me., in the case of Roland B. Conklin and others against the United States Ship Building Co. It affirms the appointment of James Smith, Jr., as receiver for the Hyde Windlass Co.; but until completion of existing contracts with the government the Bath Iron Works will not come into full possession of the receiver.

Denver-Colorado Springs-Pueblo, Col.—Low excursion rates via Nickel Plate Road, Oct. 3 and 4. Tickets good to return to Oct. 30, '03. Get particulars from nearest agent or address E. A. Akers, C. P. & T. A., Cleveland, O.

The annual report of the Colorado Fuel & Iron Co. for the year ended June 30 last has just been given out. The net earnings from operating departments carried to the credit of income account were \$1,990,982, an increase of \$344,921. The total net earnings from all sources amounted to \$2,057,342, which provided for all fixed charges, sinking funds, preferred stock dividends paid Feb. 20, 1903, etc., leaving a balance of \$203,611, which was carried to the credit of profit and loss. The balance to the credit of profit and loss account is \$586,112, representing accrued and undivided profits at the close of the current business year. After mentioning the additions made to the plant during the year, the outgoing president, J. A. Keller, says: "The same difficulties were encountered in operating the Minnequa plant this year as last, and all of the costs were largely increased by reason of the additional expense caused by operating the steel works, while so much construction was going on." The auditor's report shows that during the year \$5,000,000 of new 5 per cent. ten-year gold debenture bonds was issued, and the amount outstanding at the end of the year was \$14,068,000.

Considerable surprise was expressed when the newspapers announced that Miss Alice Roosevelt, daughter of the President, was to take a trip in the submarine torpedo boat Moccasin. Not that the Moccasin has not made trips and made them safely, but that it seemed an unnecessary instance of jeopardy; for drowning is but a matter of a few moments. What if some derangement should occur to the machinery and the vessel should refuse to rise. Accidents will happen in the best regulated ships. In the case of a submarine the predicament would be mighty uncomfortable. However, Miss Roosevelt has had her submarine experience. The Moccasin was tied to the dock, then submerged, and, after a few minutes, brought to the surface again. All of which, so long as she wanted the experience, was a very sensible arrangement.

San Francisco and Los Angeles.—Via Nickel Plate Road. Greatly reduced fare Oct. 7 to 16 inclusive. Tickets good to return till Nov. 30, '03. Get special features including stop-over privileges, etc., from nearest Agent or address E. A. Akers, C. P. & T. A., Cleveland, O.

Chicago Excursion Rates.—One fare for round trip via Nickel Plate Road, September 26 and 28, 1903, for Chicago Centennial Jubilee. Get full information from nearest agent or address E. A. Akers, C. P. & T. A., Cleveland, O.

It is quite likely now that Secretary Moody will decide in favor of 18-knot battleships instead of 17 knots for the new 13,000-ton type. Considerable opposition has been manifested to the slower speed.

BELLEVILLE WATER-TUBE BOILERS

NOW IN USE (FEBRUARY, 1903)

On Board Sea-going Vessels, NOT INCLUDING New Installations Building or Erecting.

French Navy	-	-	-	-	-	-	-	-	276,460 H. P.
English Royal Navy	-	-	-	-	-	-	-	-	849,300 "
Russian Imperial Navy	-	-	-	-	-	-	-	-	193,900 "
Japanese Imperial Navy	-	-	-	-	-	-	-	-	122,700 "
Austrian Imperial Navy	-	-	-	-	-	-	-	-	32,900 "
Italian Royal Navy	-	-	-	-	-	-	-	-	13,500 "
Chilian Navy	-	-	-	-	-	-	-	-	26,500 "
Argentine Navy	-	-	-	-	-	-	-	-	13,000 "
The "Messageries Maritimes" Company	-	-	-	-	-	-	-	-	87,600 "
Chemins de fer de l'Ouest: (The French Western Railway Co.)	-	-	-	-	-	-	-	-	Steamships
plying between Dieppe and Newhaven	-	-	-	-	-	-	-	-	18,500 "
Total Horse Power of Boilers in Use	-	-	-	-	-	-	-	-	1,634,360

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### CAMPAIGN FOR AN AMERICAN MERCHANT MARINE.

Mr. Aaron Vanderbilt, chairman of the committee on merchant marine of the New York Board of Trade & Transportation, in discussing the activity of the board at the present time in its campaign for a revival of the American merchant marine, said:

"We have with deep concern been watching our shipping in the foreign trade steadily decline for many years, hoping something would be done to remedy matters. We see a great business of ocean transportation to which the United States is one of the largest contributors, in which the finest ships afloat are engaged, and whose earnings run into the hundreds of millions of dollars annually, in which American shipping participates to the extent of less than 10 per cent.

"As in 1861 the United States had three times as large a tonnage engaged in ocean transportation as we now have, we want to know what has caused the decline, especially as the present value of our foreign commerce is four times larger than it was in 1861. We want to know why our people don't build the larger part of the ships that carry our foreign commerce, and why our own people don't own and operate them. This is something that we believe the whole country wants to know, and our purpose in trying to find it out is in order that in the discussion some thoroughly practicable, effective and acceptable solution of the problem how best to proceed to remedy this condition may be evolved. This we believe to be a timely, a commendable and a popular undertaking. Our hope and aim will be to keep the discussion free from partisan or political heat or bias. We are not concerned in contributing through this issue to the 'political capital' of either party. It is a business question, pure and simple, in which the whole country is interested, and it should be considered and discussed in a business and temperate manner.

"The action of the Board of Trade & Transportation in appointing a committee to investigate the decline of American shipping in the foreign trade has called forth expressions of approval and support in all parts of the country that are both gratifying and inspiring. It cannot be said too emphatically that the committee does not purpose turning its back upon nor ignoring any suggestion that may be made in good faith and sincerity. The advocates of free ships are as welcome to us as are the advocates of large subsidies, and the believers in discriminating dues and duties will have the same opportunity to present their arguments that is given to the subsidy and free ship advocates.

"It is a 'free-for-all' discussion, and if out of it all shall be formulated a plan for upbuilding our shipping in the foreign trade that shall be practicable and effective that is what the people are more concerned about than in the discussion of abstruse or impracticable theories. We shall ask the free ship advocates to explain whether they believe that foreign ships should be admitted to our coastwise trade or confined wholly to our foreign trade, and whether they would have the laws repealed that require that the masters and officers of American vessels shall be American citizens. Most of all, in respect of this particular phase of the discussion, we desire to know how effective free ship laws in other countries have been in building up their merchant shipping, especially in Great Britain, whose ships have so long made her the unchallenged mistress of the seas.

"We shall ask the subsidy advocates to make good by acceptable proofs their assertions that subsidies stimulate the building and economical operation of ships, and especially the claim that the subsidies which come from the people go back to the people in the lower freight charges resulting from subsidies. We shall also want to clearly define the dividing line between 'pay for carrying the mails' and 'subsidies and bounties.'

"We shall also ask the discriminating dues and duty advocates to say how best the practical and seemingly serious difficulties of abrogating or denouncing some thirty or forty treaties and conventions that we now have with as many different countries can be overcome without undue international friction, whether they believe the discrimination should be through a reduction of the dues and duties now in force on American ships and on the imports carried therein, as compared with foreign ships, or whether foreign ships and the goods they import should pay higher dues and duties than they now pay, and how we could discriminate against ships bringing imports that are free of duties and ships that come here in ballast; also how serious the retaliation by other countries would be if this system were adopted, and how such possible retaliation could be met without placing a check upon our export trade. The line of our inquiries is to be eminently practical and trite generalities will be of little value to us, as, most of all, we desire specific details in connection with each policy advocated.

"The newspapers of the country," continued Mr. Vanderbilt, "can be of the utmost assistance to us in presenting to their readers the salient facts of the decline in our shipping, in securing suggestive statements and interviews from men of prominence and influence in their vicinity, and in presenting editorial views as to the practicability and effectiveness of the plans suggested, their good and their bad features, and, most of all, their views as to what the people will be willing to 'stand for,' should it develop that congressional legislation is necessary. We hope that commercial, labor and agricultural associations in all parts of the country will take this subject under discussion and debate, formulating their final conclusions in expressive resolutions.

"The great political parties," concluded Mr. Vanderbilt, "have

been promising for many years to enact legislation to build up our shipping in the foreign trade but so far nothing effective has been accomplished. Perhaps the business people, the farmers and the wage workers can evolve a plan which will command the support of both parties and which can be discussed without partisan bitterness. That is what we hope for."

### AMERICAN SHIPPING SHOULD BE STIMULATED.

At the Seattle convention of the Trans-Mississippi Commercial Congress held a few days ago the following resolution in favor of the upbuilding an American merchant marine were adopted:

"Resolved, By the Trans-Mississippi Congress, in fourteenth annual convention assembled, and representing twenty-one states and territories west of the Mississippi river, that the decline of our oversea American merchant marine from carrying 90 per cent. of our export products in American bottoms down to 9 per cent. is an anomaly in the industrial development of the United States, and for a nation with a greater coast line, greater resources, and an unbroken record of enterprise and intrepidity on the ocean from Paul Jones to George Dewey, is a national disgrace;

"Resolved, That every ship is a missionary of trade; that steam lines work for their own countries just as railroad lines work for their terminal points, and that it is as absurd for the United States to depend upon foreign ships to distribute our products as it would be for a department store to depend upon the wagons of a competing house to deliver its goods;

"Resolved, That it is the sense of this congress that the congress of the United States should enact such laws as will tend to build up the American merchant marine."

The Review has maintained all along, and must continue to maintain, that until congress comes to the relief of shipping there will not for many years be an adequate merchant marine belonging to the United States. The road to travel through natural processes is a long one and beset with many hardships. The American vessel is handicapped by higher cost and a higher wage and must have governmental aid to compete even on equal terms with the ships of other nations.

### TRADE NOTES.

The New York offices of the sales organization of the Westinghouse Electric & Manufacturing Co., consisting of the New York sales department, department "I," the export department, and the general agent's office, have been removed to the new Hanover Bank building, corner of Nassau and Pine streets. The new offices occupy the entire seventeenth floor of this building, one of the finest and best equipped office buildings in the country, where the arrangements and facilities will be of the best, both for the representatives of the company and the public with whom they do business. The mail address of the several departments of the sales organization in New York will be No. 11 Pine street. The executive, financial and stock transfer officers will remain on the fourth floor of the Equitable building. The present organization of the Westinghouse Electric & Manufacturing Co. has been quartered in the Equitable building since 1889, but the rapid and material increase of business has made the above move necessary.

The Magnolia Metal Co., New York, announces that it has returned to its factory at No. 113-115 Bank street, New York, which was destroyed by fire about a year ago. The factory has been rebuilt and equipped with all modern convenience for the manufacture of all grades of babbit metal.

The New York sales offices of the Nernst Lamp Co. have recently been removed from the Equitable building and transferred to the new Hanover Bank building, No. 11 Pine street.

With two long, deep furrows extending along the port and starboard sides of her underbody the cruiser Olympia is resting in the wooden dry dock at the Norfolk navy yard. The work of docking the vessel was a delicate task for Naval Constructors Evans, but it was accomplished safely and for the first time since the vessel ran on the rocks near Portland, Me., the damage has been seen. Along the starboard side of the Olympia's bottom for 96 ft. there extends an indentation 2½ in. deep. On the port side for 45 ft. the plates are dented to a depth of 5½ in., and many are buckled.

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## ITEMS OF GENERAL INTEREST.

The Maryland Steel Co., Sparrow's Point, Md., now has five dredges under way for the government, the latest contract awarded to it being the one for Savannah harbor. This dredge was fully described in the issue of the Review of Aug. 20.

Negotiations have been proceeding recently respecting the establishment of a direct traffic between the Russian Black sea ports and Japan. A Japanese company possessing many ocean steamers is said to be prepared to undertake a steamship service between Odessa, Batoum, Sebastopol and Japanese ports.

P. & F. Corbin, New Britain, Conn., have issued an excellent lithograph in brown tone of the sky line of New York city as seen from New Jersey city. In all of these skyscrapers Corbin hardware has been used, as indeed, the company adds, it has been used in nearly all of the large buildings of the country.

Last year shipping to the extent of 11,500,000 tons entered the Japanese open ports. Of this the British ships amounted to 4,155,789 tons, Japanese to 4,372,572 (counting only Japanese vessels engaged in foreign trade) and German to 1,220,297 tons. In 1898, out of a little over 8,000,000 tons, over 4,000,000 were British, over 2,000,000 Japanese and 696,497 German.

It is a significant thing that the Cunard company is to hold a meeting shortly to determine whether the machinery of the new 25-knot steamships shall be of the turbine type or of the usual reciprocating style. The fact that this extremely conservative company should be deliberating over the matter shows what strides have been made in the development of the turbine engine.

A parliamentary sub-commission has been appointed in Italy to look after the maritime interests; and in connection with this, delegates have started for English, French, German, Dutch, Austrian and other European ports, to collect information respecting all matters relating to the shipping trade. The sub-commission will report to the royal commission, which meets at the end of October to formulate propositions to lay before the government.

The old battleship Belleisle was torpedoed at Portsmouth last week and sank at her moorings. For the purposes of the experiment a section had been constructed on the port side of the Belleisle representing the side of a modern battleship. This was filled with an American invention which, it was claimed, would prevent a ship from sinking when the hull is penetrated below the water line. When the vessel was struck a huge column of water enveloped her, she rolled heavily and then settled down with a list to port. The Belleisle will be raised for further experiments. It is said that the damage to the ship's bottom is extensive.

The government's inspector of the navigation of the Rhine within Prussian territory has made a report for 1902 which shows that the total traffic at the ten more important harbors of Ober-

lahnstein, Coblenz, Cologne, Neuss, Düsseldorf, Uerdingen, Hochfeld-Duisburg, Duisburg, Ruhrort, and Wesel has increased from 8,272,520 tons in 1893 to 14,780,607 tons, or 79 per cent., in 1902. The Rhine fleet at the end of August, 1902, numbered 9,574 vessels, with crews numbering 28,605. Of these, 1,183 are steamers, with an aggregate of 243,499 H. P., and 8,391 vessels and barges, with a carrying capacity of 2,853,227 tons. Of the total horse power of the steamers, 70 per cent. belong to Germany, 26 per cent. to Holland, and 4 per cent. to Belgium and other countries. Of the tonnage of the sailing vessels and barges, 51 per cent. belong to Germany, 35 per cent. to Holland, and 14 per cent. to Belgium.

The number of new vessels to be laid down for the French navy in 1904 is seventy, but of this total fifty are torpedo boats to be built by private firms, besides which sixteen more submarines are to be built in the French government arsenals, with the view, no doubt, of ensuring secrecy as to their details. One armored cruiser is to be laid down at Brest; she will be a sister ship to the Ernest Renan, and will have a displacement of 13,644 tons. She will be 523 ft. 4 in. long by 71 ft. 2 in. beam, and she will be fitted with vertical triple-expansion engines, supplied with steam from water-tube boilers, working up to 36,000 H. P. and driving three screws. The speed anticipated is 23 knots. Two torpedo boat destroyers, which are to be built at Rochefort, are to be of the Stylet type, with a displacement of 335 tons, and engines of 7,200 H. P. Their maximum speed is to be 30 knots. Of the torpedo boats proposed to be built in 1904, one is to be constructed at Saigon. Each torpedo boat is to be 126 ft. 8 in. in length by 14 ft. 1 in. beam, and is to steam at the rate of 26 knots. The armament of these vessels is to be two guns and three torpedo tubes.

Judge Archibald, of the United States circuit court, eastern district, Pennsylvania, has just handed down a decision in the suit of the Westinghouse Electric & Manufacturing Co. against H. C. Roberts and Sangamo Electric Co., which has an important bearing upon alternating current meters and fan motors. The suit was under the so-called Tesla split-phase patents. The defendants' device against which suit was brought was the Sangamo meter. The court, after a careful review of the testimony, decided that the complainants had satisfactorily proved that Tesla's date of invention preceded that of Ferraris' and others, and that the device in question was an infringement. Evidence was adduced by the Westinghouse Electric & Manufacturing Co. showing conclusively that Tesla's date of invention was several months prior to the Ferraris publication. The importance of these patents can scarcely be over-estimated as the most successful alternating current meters and motors of small size are tributary to them.

**Two Steamers for Sale.**

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**\$5,000 Buys Steamer Inter Ocean**

Length 214 ft., beam 36 ft. Capacity 1600 tons. Steeple-compound engine. Boiler allowed 110 lbs. steam. Address C. S. Mahoney, 17 Main St., Buffalo, N. Y. tf

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For sale cheap. Scotch marine boiler 10 ft. by 78 in. triple riveted, 3/4 steel plate, dome 6 ft. by 24 in., 98 three inch tubes, stays 3/8 center; allowed 168 lbs steam pressure. Boiler is now working and is as good as new. Address I. Applebaum, Detroit, Mich. tf

**Steamer and Tow Barge for Sale.**

Lake steamer and tow for sale. Total tonnage 1,000. Equipment complete. A-1 condition. Address, G. M., care Marine Review Pub. Co., 39-41 Wade Bldg., Cleveland, O. Sept. 17

**Wanted—Hydraulic Steering Gear.**

Good second hand gear suitable for a tug. Give price, description and where situated. H. M. Loud's Sons Co., Au Sable, Mich. Sept. 24

**Steam Yacht Wanted.**

Wanted—A steam yacht about 75 ft. long, 18 ft. beam, drawing not over 8 ft. when loaded; steel hull preferred. To be of a height to pass under bridges with 17 ft. head room. Speed to be not less than twelve miles an hour. To have a carrying capacity of seventy-five (75) persons without crowding. To have good kitchen accommodations. The entire mechanical equipment and all of the appointments of the boat to be first class. Send description of boat and machinery, photographs and terms to Thomas J. Webb, 117-121 W. Randolph street, Chicago. Oct. 1

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Length 75 ft., breadth 13.9 ft., depth 7.6 ft. Enquire H. Heinecke, Sheboygan, Wis. Sept. 24

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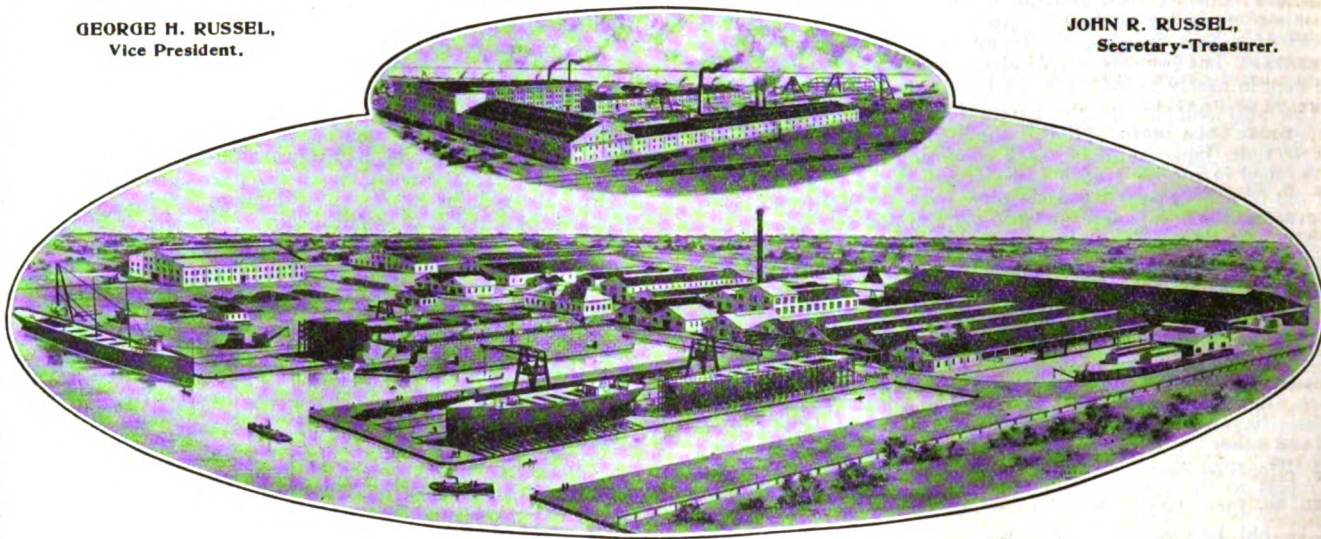
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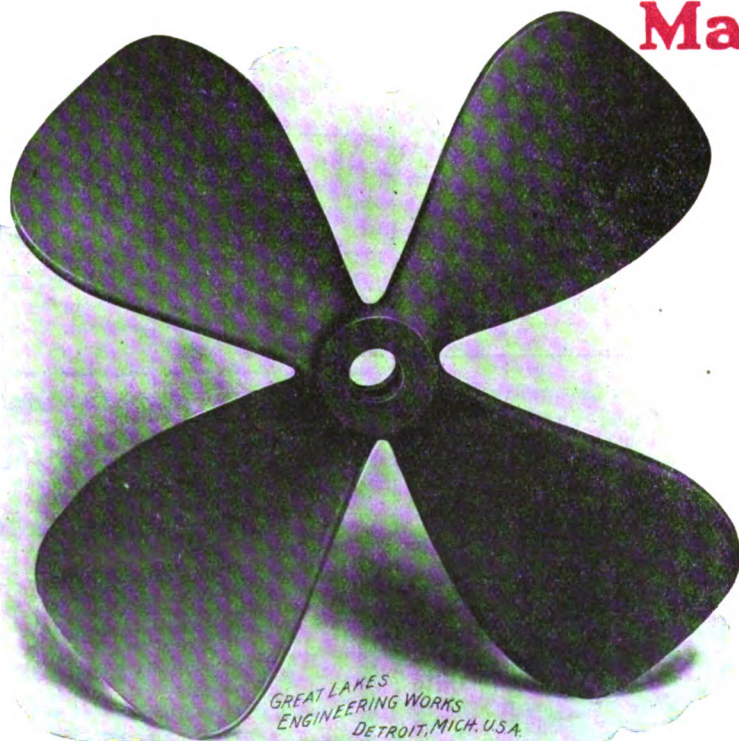
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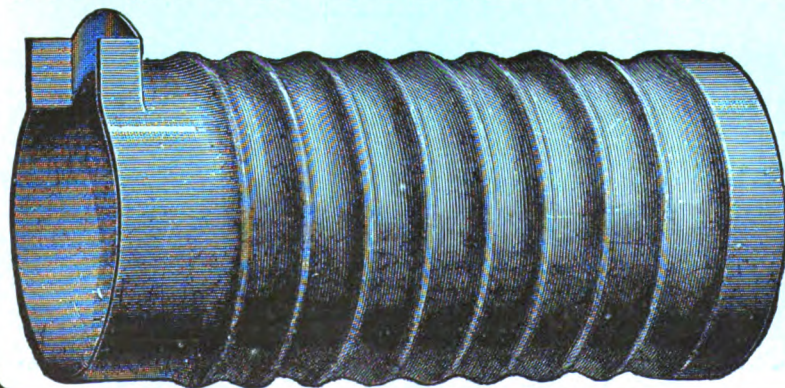
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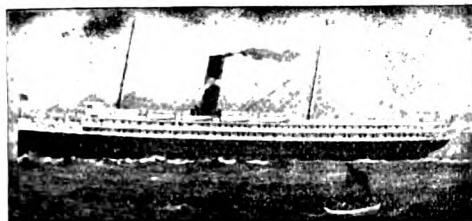
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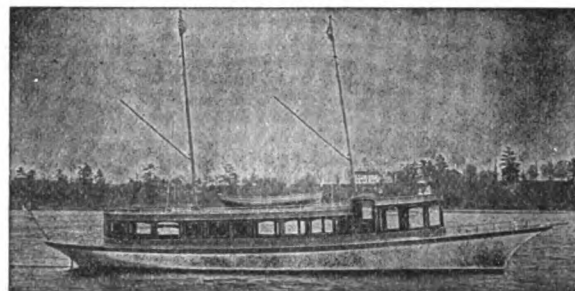
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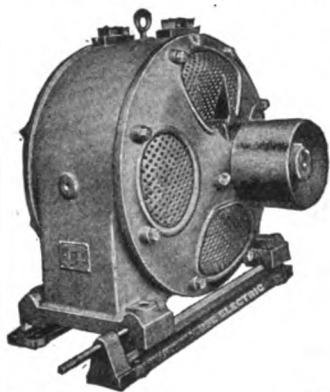
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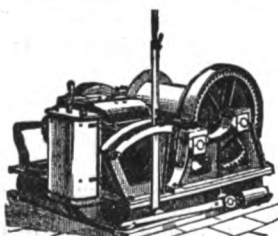
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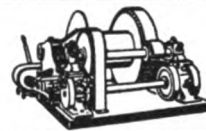
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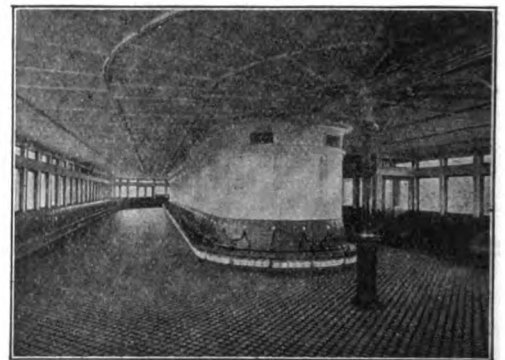
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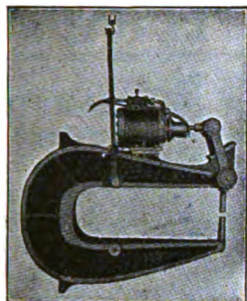
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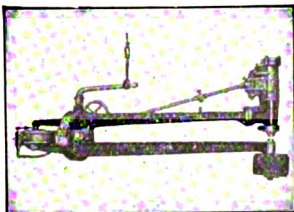
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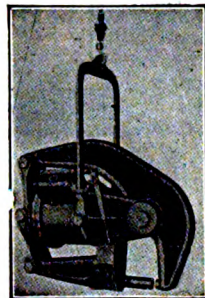


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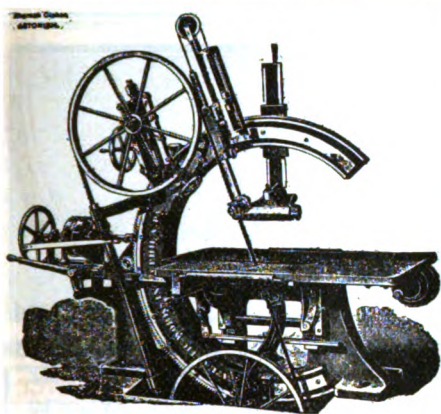
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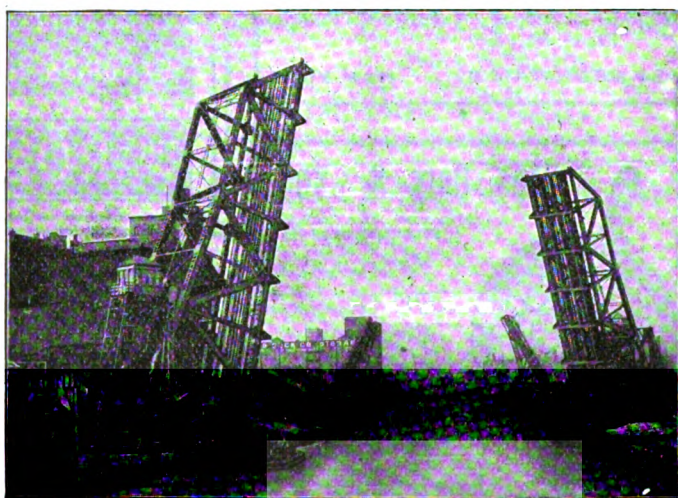
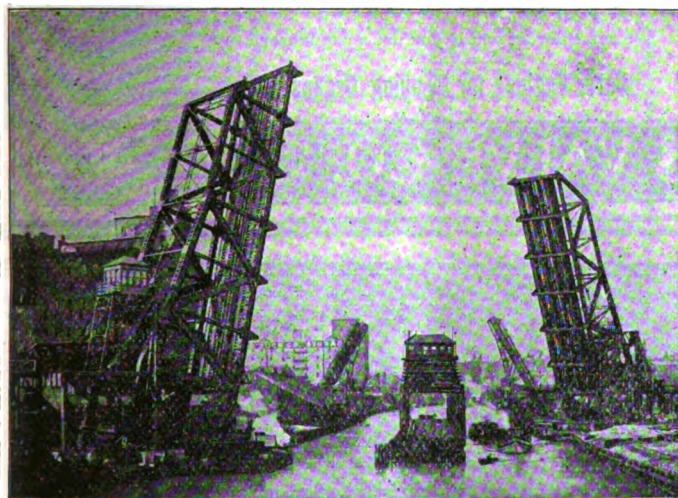
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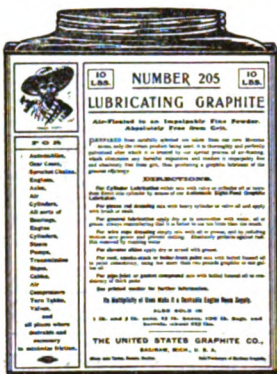
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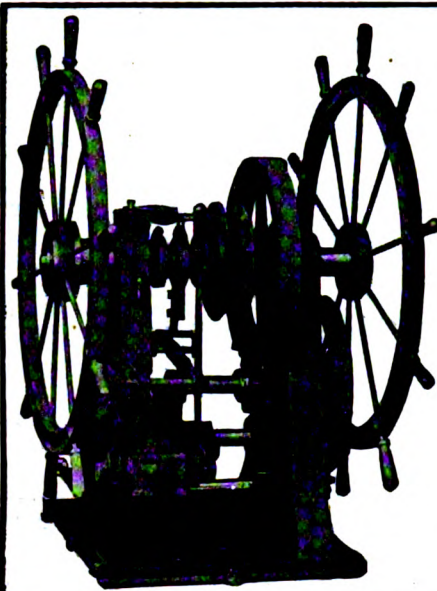
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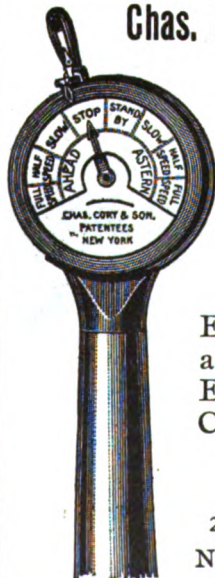
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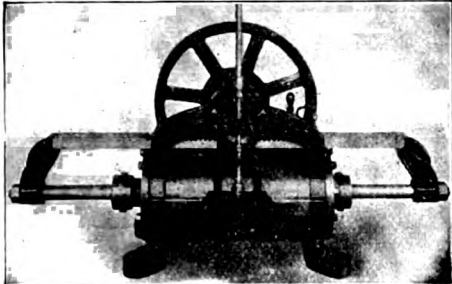
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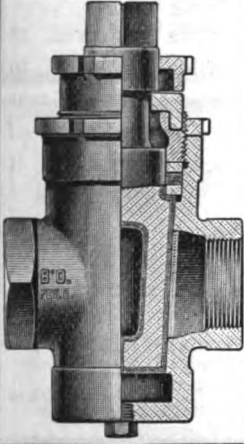
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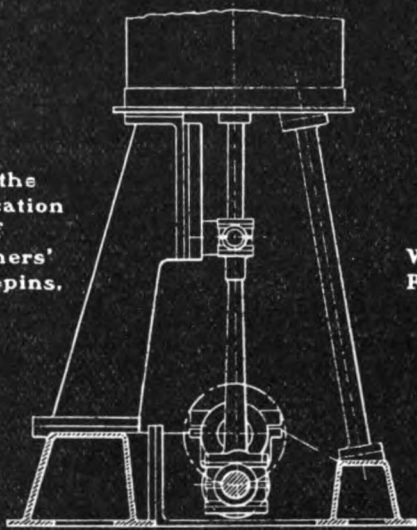
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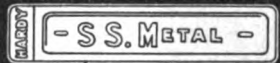
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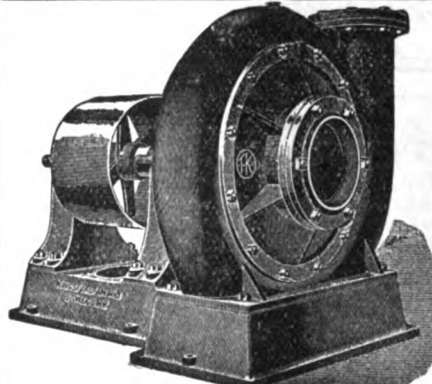
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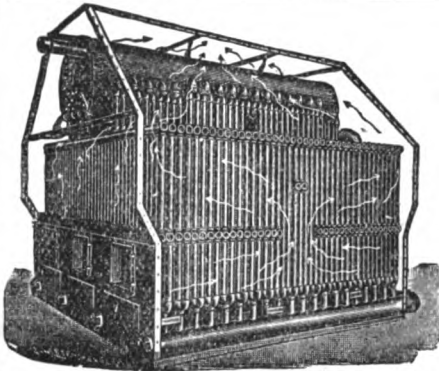
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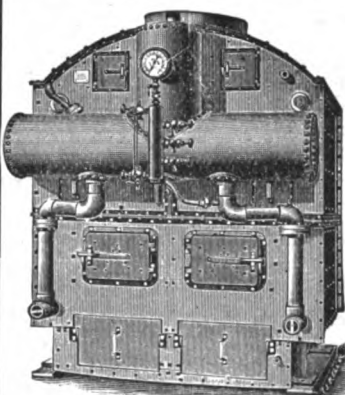
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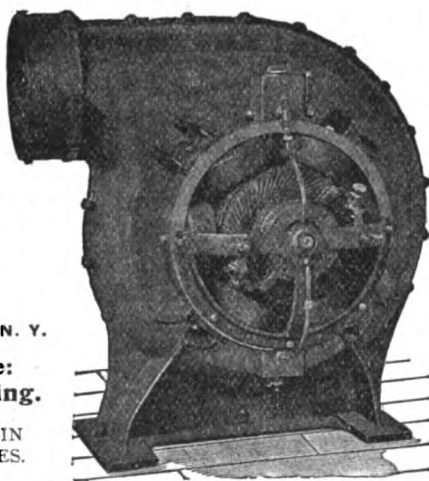
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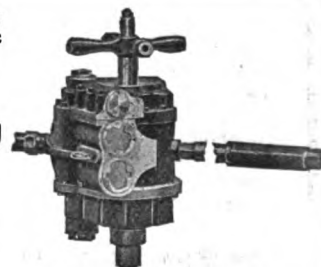
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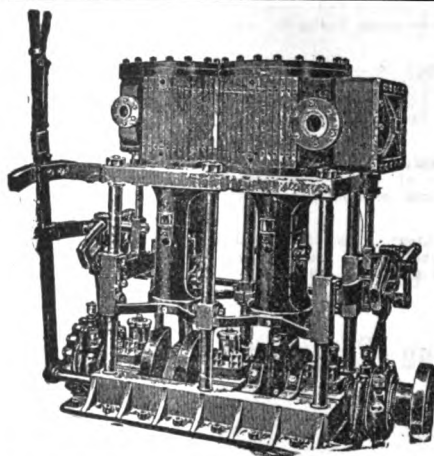
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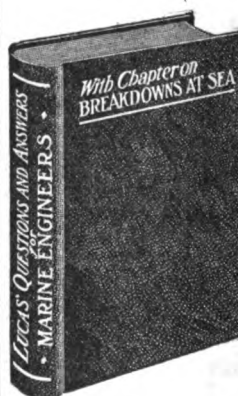
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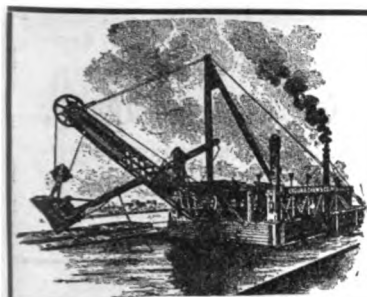
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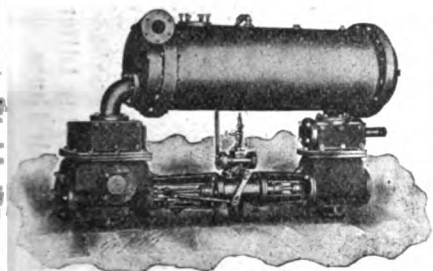
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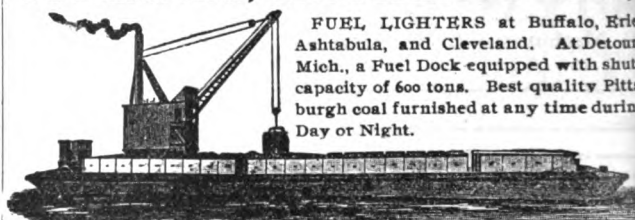


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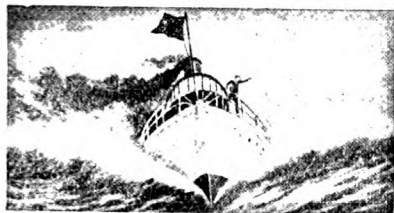
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Ore Docks and Harbor, two views.

Unloading Ore, two views.

Globe Iron Works Ship Yard.

Globe Iron Works Ship Yard, Laying Keel of No. 400.

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Unloading Ore—Brown Conveying Hoists, two views.

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Winter in Detroit River.

Car Ferry turning in ice—two views.

"Michigan Central" entering slip.

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Nightfall on the River.

A Lumber Tow.

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General View of Locks from Offices.

Poe Lock, from below, closed.

Poe Lock, from below, open.

Poe Lock, from above.

Poe Lock, with Whaleback.

Weltzel Lock, from above.

Weltzel Lock, from below.

Str. North-Land Passing Locks, two views.

Upper Entrance to Lock Canal.

Gate Mechanism.

Interior of Power House.

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 Penberthy Injector Co. .... Detroit, Mich.

## INSURANCE, MARINE.

Brown & Co. .... Buffalo.  
 Elphicke, C. W. & Co. .... Chicago.  
 Fleming & Co., P. H. .... Chicago.  
 Hawgood & Co., W. A. .... Cleveland.  
 Helm & Co., D. T. .... Duluth.  
 Hutchinson & Co. .... Cleveland.  
 McCarthy, T. R. .... Montreal.  
 McCurdy, Geo. L. .... Chicago.  
 Mitchell & Co. .... Cleveland.  
 Peck, Chas. E. & W. F. .... New York and Chicago.  
 Richardson, W. C. .... Cleveland.  
 Sullivan, D. & Co. .... Chicago.  
 Weeks, F. H. .... New York.

## IRON ORE AND PIG IRON.

Bourne-Fuller Co. .... Cleveland.  
 Hanna, M. A. & Co. .... Cleveland.  
 Pickands, Mather & Co. .... Cleveland.

## LAUNCHES—STEAM, NAPHTHA, ELECTRIC.

Marine Construction & D. D. Co. ....  
 .... Mariner's Harbor, S. I., N. Y.  
 Truscott Boat Mfg. Co. .... St. Joseph, Mich.  
 Warrington Iron Works. .... Chicago.  
 Willard, Chas. P. .... Chicago.

## LIFE FLOATS.

Carley Life Float Co. .... New York.

## LIFE PRESERVERS, LIFE BOATS, BUOYS.

Armstrong Cork Co. .... Pittsburg.  
 Carley Life Float Co. .... New York.  
 Drein, Thos. & Son. .... Wilmington, Del.  
 Kahnweiler's Sons, D. .... New York.  
 Lane & DeGroot. .... Long Island City, N. Y.  
 Marine Construction & Dry Dock Co. ....  
 .... Mariner's Harbor, S. I., N. Y.  
 Ripple Hardware Co. .... Grafton, Ill.

## LIGHTS, SIDE AND SIGNAL.

Helvig, H. A. J. .... New York.  
 Russell & Watson. .... Buffalo.

## LOGS.

Bliss, John & Co. .... New York.  
 Nicholson Ship Log Co. .... Cleveland.  
 Walker & Sons, Thomas. .... Birmingham, Eng.  
 Also Ship Chandlers.

## LUBRICATING GRAPHITE.

Dixon Crucible Co., Joseph. .... Jersey City, N. J.  
 United States Graphite Co. .... Saginaw, Mich.

## LUMBER.

Martin-Barriss Co. .... Cleveland.  
 Moran Bros. Co. .... Seattle, Wash.  
 Shurick, F. S. .... New York.

## MACHINISTS.

Chase Machine Co. .... Cleveland.  
 Lockwood Mfg. Co. .... East Boston, Mass.  
 Macbeth Iron Co. .... Cleveland.  
 Union Machine & Boiler Co. .... Cleveland.

## MACHINE TOOLS (WOOD WORKING).

Atlantic Works, Inc. .... Philadelphia.

## MAN-HOLES, SWING DOORS, ETC.

"Long-Arm" System Co. .... Cleveland.

## MARINE RAILWAYS, BUILDERS OF

Crandall & Son, H. I. .... East Boston, Mass.

## MATTRESSES, CUSHIONS, BEDDING.

Fogg, M. W. .... New York.

## MECHANICAL DRAFT FOR BOILERS.

American Ship Building Co. .... Cleveland.  
 Bloomsburg & Co., H. .... Baltimore, Md.  
 Detroit Ship Building Co. .... Detroit.  
 Sturtevant, B. F. Co. .... Boston.

## METALLIC PACKING.

Hayden Mfg. Co., N. L. .... Columbus, O.  
 Katzenstein, L. & Co. .... New York.  
 U. S. Metallic Packing Co. .... Philadelphia.

## METAL POLISH.

Bertram's Oil Polish Co. .... Boston.

## MOTORS, GENERATORS—ELECTRIC.

Electro-Dynamic Co. .... Philadelphia.  
 Elwell-Parker Electric Co. .... Cleveland.  
 General Electric Co. .... Schenectady, N. Y.  
 "Long-Arm" System Co. .... Cleveland.  
 Sturtevant, B. F. Co. .... Boston.  
 Westinghouse Electric & Mfg. Co. .... Pittsburg, Pa.

## NAUTICAL INSTRUMENTS.

Bliss, John & Co. .... New York.  
 Ritchie, E. S. & Sons. .... Brookline, Mass.

## NAUTICAL SCHOOLS.

Chicago Nautical School. .... Chicago.  
 Seattle Nautical School. .... Seattle, Wash.

## NAVAL ARCHITECTS.

Gaskin, Edward. .... Buffalo.  
 Kidd, Joseph. .... Duluth, Minn.  
 Logan, Robert. .... Cleveland.  
 Matteson & Drake. .... Philadelphia.  
 Mosher, Chas. D. .... New York.  
 Newman, R. L. .... New York.  
 Sadler, Perkins & Field. .... New York.  
 Wood, W. J. .... Chicago.

## OAKUM.

DeGrauw, Aymar & Co. .... New York.  
 Stratford Oakum Co. .... Jersey City, N. J.

## OIL FOR PAINTING.

Sipe & Co., James B. .... Allegheny, Pa.

## OILS AND LUBRICANTS.

Dixon Crucible Co., Joseph. .... Jersey City, N. J.  
 Standard Oil Co. .... Cleveland.  
 United States Graphite Co. .... Saginaw, Mich.

## PACKING.

Crane Co. .... Chicago.  
 Hayden Mfg. Co., N. L. .... Columbus, O.  
 Jenkins Bros. .... New York.  
 Katzenstein, L. & Co. .... New York.  
 New York Belting & Packing Co. .... New York.  
 United States Graphite Co. .... Saginaw, Mich.  
 United States Metallic Packing Co. .... Philadelphia.

## PAINTS.

Baker, Howard H. & Co. .... Buffalo.  
 Berry Bros., Ltd. .... Detroit.  
 Detroit Varnish Co. .... Detroit.  
 Detroit White Lead Works. .... Detroit.  
 Mohawk Paint & Chemical Co. .... Norwich, Conn.  
 New Jersey Zinc Co. .... New York.  
 Sipe & Co., James B. .... Allegheny, Pa.  
 United States Graphite Co. .... Saginaw, Mich.  
 Upson-Walton Co. .... Cleveland.

## PATENT ATTORNEYS.

Thurston & Bates. .... Cleveland.

## PATTERN SHOP MACHINERY.

Atlantic Works, Inc. .... Philadelphia.

## PIPE—BRASS AND COPPER, IRON PIPE SIZE.

Waterbury Brass Co. .... New York.

## PIPE-JOINT COMPOUND.

United States Graphite Co. .... Saginaw, Mich.

## PIPE, WROUGHT IRON.

Bourne-Fuller Co. .... Cleveland.  
 Crane Co. .... Chicago.  
 Macbeth Iron Co. .... Cleveland.

## PLANING MILL MACHINERY.

Atlantic Works, Inc. .... Philadelphia.

## PLATES—SHIP, STRUCTURAL, ETC.

Bourne-Fuller Co. .... Cleveland.

## PLUMBING, MARINE.

Reilly Repair & Supply Co., James. .... New York.  
 Sands, Alfred B. & Son. .... New York.

## PNEUMATIC TOOLS.

Allen, John F. .... New York.  
 Chicago Pneumatic Tool Co. .... Chicago.

## POLISH FOR METALS.

Bertram's Oil Polish Co. .... Boston.



## BUYERS' DIRECTORY OF THE MARINE TRADE.—Continued.

## POWER DOORS AND HATCHES.

"Long-Arm" System Co. ....Cleveland.

## PRESSURE REGULATORS.

Kieley & Mueller .....New York.  
Ross Valve Co. ....Troy, N. Y.

## PROPELLER WHEELS.

American Ship Building Co. ....Cleveland.  
Atlantic Works. ....East Boston, Mass.  
Bath Iron Works, Ltd. ....Bath, Me.  
Cramp, Wm. & Sons. ....Philadelphia.  
Crescent Ship Yard Co. ....Elizabethport, N. J.  
Detroit Ship Building Co. ....Detroit.  
Fore River Ship & Engine Co. ....Quincy, Mass.  
Great Lakes Engineering Works. ....Detroit.  
Hyde Windlass Co. ....Bath, Me.  
Jenks Ship Building Co. ....Port Huron, Mich.  
Lockwood Mfg. Co. ....East Boston, Mass.  
Macbeth Iron Co. ....Cleveland.  
Maryland Steel Co. ....Sparrow's Point, Md.  
Milwaukee Dry Dock Co. ....Milwaukee.  
Moran Bros. Co. ....Seattle, Wash.  
Needle & Levy Ship & Engine Building Co. ....Phila.  
Newport News Ship Building Co Newport News, Va.  
Phosphor Bronze Smelting Co., Ltd. ....Philadelphia.  
Ridson Iron Works. ....San Francisco.  
Roelker, H. B. ....New York.  
Sheriffs Mfg. Co. ....Milwaukee.  
Superior Shipbuilding Co. ....Superior, Wis.  
Thorp & Sons Co., J. E. ....Trenton, N. J.  
Trout, H. G. ....Buffalo.  
United States Ship Building Co. ....New York.

## 'PROJECTORS, ELECTRIC.

Elwell-Parker Electric Co. ....Cleveland.  
General Electric Co. ....Schenectady, N. Y.  
Westinghouse Electric & Mfg. Co. ....Pittsburg, Pa.

## PUMPS FOR VARIOUS PURPOSES.

Blake, Geo. F. Mfg. Co. ....New York.  
Great Lakes Engineering Works. ....Detroit.  
Kingsford Foundry & Machine Wks. Oswego, N. Y.  
"Long-Arm" System Co. ....Cleveland.

## PUNCHES, RIVETERS, SHEARS.

Allen, John F. ....New York.  
Chicago Pneumatic Tool Co. ....Chicago.

## REFRIGERATING APPARATUS.

Roelker, H. B. ....New York.

## REGISTER FOR CLASSIFICATION OF VESSELS.

Great Lakes Register .....Cleveland  
Record of American & Foreign Shipping. ....New York.

## RELEASING HOOKS FOR DETACHING BOATS.

Standard Automatic Releasing Hook Co. ....New York.

## RIVETING MACHINES.

Allen, John F. ....New York.  
Chicago Pneumatic Tool Co. ....Chicago.

## RIVETS, STEEL, FOR SHIPS AND BOILERS.

Bourne-Fuller Co. ....Cleveland.

## RANGES.

Russell & Watson .....Buffalo.

## RIVETS—BRASS AND COPPER.

Waterbury Brass Co. ....New York.

## SAFETY VALVES.

American Steam Gauge Co. ....Boston.  
Ashton Valve Co. ....Boston.  
Crane Co. ....Chicago.  
Hayden Mfg. Co., N. L. ....Columbus, O.  
Lunkenheimer Co. ....Cincinnati.

## SAIL MAKERS.

Baker, Howard H. & Co. ....Buffalo.  
Upson-Walton Co. ....Cleveland.  
Wilson & Silsby .....Boston.

## SALVAGE COMPANIES.

See Wrecking Companies.

## SCHOOLS, NAUTICAL.

Chicago Nautical School .....Chicago.  
Seattle Nautical School .....Seattle, Wash.

## SEARCH LIGHTS.

Elwell-Parker Electric Co. ....Cleveland.  
General Electric Co. ....Schenectady, N. Y.  
Westinghouse Electric & Mfg. Co. ....Pittsburg, Pa.

## SHEARS.

See Punches, Rivets, and Shears.

## SHIP AND BOILER PLATES AND SHAPES.

Bourne-Fuller Co. ....Cleveland.

## SHIP BUILDERS.

American Ship Building Co. ....Cleveland.  
Atlantic Works. ....East Boston, Mass.  
Bath Iron Works, Ltd. ....Bath, Me.  
Buffalo Dry Dock Co. ....Buffalo.  
Cramp, Wm. & Sons. ....Philadelphia.

Craig Ship Building Co. ....Toledo, O.  
Chicago Ship Building Co. ....Chicago.  
Crescent Ship Yard Co. ....Elizabethport, N. J.  
Detroit Ship Building Co. ....Detroit.  
Fore River Ship & Engine Co. ....Quincy, Mass.  
Great Lakes Engineering Works. ....Detroit.  
Jenks Ship Building Co. ....Port Huron, Mich.  
Lockwood Mfg. Co. ....East Boston, Mass.  
Manitowoc Dry Dock Co. ....Manitowoc, Wis.  
Marine Construction & Dry Dock Co. ....  
.....Mariner's Harbor, S. I., N. Y.  
Maryland Steel Co. ....Sparrow's Point, Md.  
Milwaukee Dry Dock Co. ....Milwaukee.  
Moran Bros. Co. ....Seattle, Wash.  
Needle & Levy Ship & Engine Building Co. ....Phila.  
Newport News Ship Building Co Newport News, Va.  
Ridson Iron Works. ....San Francisco.  
Roelker's Ship Yard .....Chester, Pa.  
Shipowners Dry Dock Co. ....Chicago.  
Smith & Son, Abram .....Algonac, Mich.  
United States Ship Building Co. ....New York.  
Warrington Iron Works. ....Chicago.  
Willard, Chas. P. & Co. ....Chicago.

## SHIP CHANDLERS.

Baker, Howard H. & Co. ....Buffalo.  
Moran Bros. Co. ....Seattle, Wash.  
Reilly Repair & Supply Co., James. ....New York.  
Upson-Walton Co. ....Cleveland.

## SHIP LANTERNS AND LAMPS.

Holvig, H. A. J. ....New York.  
Russell & Watson .....Buffalo.

## SHIP TIMBER.

Martin-Barriss Co. ....Cleveland.  
Moran Bros. Co. ....Seattle, Wash.  
Shurick, F. S. ....New York.

## SMOOTH-ON COMPOUND, FOR REPAIRS.

Smooth-On Mfg. Co. ....Jersey City, N. J.

## SPARS—LARGE SIZES.

Moran Bros. Co. ....Seattle, Wash.

STAYBOLTS, IRON OR STEEL, HOLLOW, OR SOLID.

Falls Hollow Staybolt Co. ....Cuyahoga Falls, O.

## STEAM VESSELS FOR SALE.

Elwell, Jas. W. & Co. ....New York.  
Holmes, Samuel .....New York.  
King, Rufus S. ....New York.  
McCarthy, T. R. ....Montreal, Can.  
Newman, R. L. ....New York.  
Weeks, F. H. ....New York.

## STEAMSHIP LINES, PASS. AND FREIGHT.

American Line .....New York.  
Cleveland & Buffalo Transit Co. ....Cleveland.  
Erle & Western Trans. Co. ....Buffalo.  
Goodrich Trans. Co. ....Chicago.  
International Mercantile Marine Co. ....Philadelphia.  
Pere Marquette R. R. & S. S. Line. ....Milwaukee.  
Red Star Line .....New York.

## STEEL CASTINGS.

Seaboard Steel Casting Co. ....Chester, Pa.  
Macbeth Iron Co. ....Cleveland.

## STEERING APPARATUS.

American Ship Building Co. ....Cleveland.  
Chase Machine Co. ....Cleveland.  
Duke Engine Co. ....Grand Haven, Mich.  
Detroit Ship Building Co. ....Detroit.  
Electro-Dynamic Co. ....Philadelphia.  
Hyde Windlass Co. ....Bath, Me.  
Jenks Ship Building Co. ....Port Huron, Mich.  
Moulton Steering Engine Co. ....New York.  
Sheriffs Mfg. Co. ....Milwaukee.

## STOCKS, BONDS, SECURITIES.

Fahey & Co. ....Cleveland.

## 'SUBMARINE DIVING APPARATUS.

Morse & Son, A. J. ....Boston.  
Schrader's Son, A. ....New York.

## SURVEYORS, MARINE.

Gaskin, Edward .....Buffalo.  
Matteson & Drake .....Philadelphia.  
Newman, R. L. ....New York.  
Wood, W. J. ....Chicago.

## TESTS OF MATERIALS.

Hunt, Robert W. & Co. ....Chicago.  
Pittsburg Testing Laboratory Ltd. ....Pittsburg.

## TILING, INTERLOCKING RUBBER.

New York Belting & Packing Co. ....New York.

## TOOLS, METAL WORKING, FOR SHIP AND ENGINE WORKS.

Allen, John F. ....New York.  
Chicago Pneumatic Tool Co. ....Chicago.  
Watson-Stillman Co. ....New York.

## TOOLS, WOOD WORKING.

Atlantic Works, Inc. ....Philadelphia.

## TOWING MACHINES.

American Ship Windlass Co. ....Providence, R. I.  
Chase Machine Co. ....Cleveland.

## TOWING COMPANIES.

Donnelly Salvage & Wrecking Co. ....Kingston, Ont.  
Midland Towing & Wrecking Co., Ltd. ....Midland, Ont.

## TRAPS, STEAM.

Kieley & Mueller .....New York.  
Lunkenheimer Co. ....Cincinnati.  
Sturtevant Co., B F. Jamaica Plain. ....Boston.

## TRUCKS.

Boston & Lockport Block Co. ....Boston.

## TUBING, SEAMLESS.

Shelby Steel Tube Co. ....Pittsburg, Pa.  
Waterbury Brass Co. ....New York.

## VALVES, STEAM SPECIALTIES, ETC.

American Steam Gauge Co. ....Boston.  
Ashton Valve Co. ....Boston.  
Bordo, L. J. ....Philadelphia.  
Crane Co. ....Chicago.  
Hayden Mfg. Co., N. L. ....Columbus, O.  
Jenkins Bros. ....New York.  
Kieley & Mueller .....New York.  
Lunkenheimer Co. ....Cincinnati.  
Ross Valve Co. ....Troy, N. Y.

## VALVES FOR WATER AND GAS.

Ross Valve Co. ....Troy, N. Y.

## VARNISHES.

Berry Brothers, Ltd. ....Detroit.  
Detroit Varnish Co. ....Detroit.  
Detroit White Lead Works. ....Detroit.  
New Jersey Zinc Co. ....New York.  
Also Ship Chandlers.

## VESSEL AND FREIGHT AGENTS.

Boland, John J. ....Buffalo.  
Brown & Co. ....Buffalo.  
Elwell, Jas. W. & Co. ....New York.  
Elphicke, C. W. & Co. ....Chicago.  
Fleming & Co., P. H. ....Chicago.  
Hall & Root .....Buffalo.  
Helm & Co., D. T. ....Duluth.  
Hawgood & Co., W. A. ....Cleveland.  
Holmes, Samuel .....New York.  
Hutchinson & Co. ....Cleveland.  
King, Rufus S. ....New York.  
McCarthy, T. R. ....Montreal.  
Newman, R. L. ....New York.  
Mitchell & Co. ....Cleveland.  
Richardson, W. C. ....Cleveland.  
Sullivan, D. & Co. ....Chicago.  
Weeks, F. H. ....New York.

## VENTILATING APPARATUS FOR SHIPS.

Sturtevant, B. F. Co. ....Boston.

## WIRE—BRASS AND COPPER.

Waterbury Brass Co. ....New York.

## WIRE ROPE AND WIRE ROPE FITTINGS.

Baker, H. H. & Co. ....Buffalo.  
DeGrauw, Aymar & Co. ....New York.  
Upson-Walton Co. ....Cleveland.

## WHISTLES, STEAM.

American Steam Gauge Co. ....Boston.  
Ashton Valve Co. ....Boston.  
Lunkenheimer Co. ....Cincinnati.

## WHITE METAL—SHEETS, RODS AND WIRE.

Waterbury Brass Co. ....New York.

## WINDLASSES.

American Ship Windlass Co. ....Providence, R. I.  
American Ship Building Co. ....Cleveland.  
Hyde Windlass Co. ....Bath, Me.  
Jenks Ship Building Co. ....Port Huron, Mich.

## WINCHES.

American Ship Windlass Co. ....Providence, R. I.  
Hyde Windlass Co. ....Bath, Me.

## WOOD WORKING MACHINERY.

Atlantic Works, Inc. ....Philadelphia.

## WRECKING AND SALVAGE COMPANIES.

Donnelly Salvage & Wrecking Co. ....Kingston, Ont.  
Midland Towing & Wrecking Co., Ltd. ....Midland, Ont.

## YACHT AND BOAT BUILDERS.

Drain, Thos. & Son .....Wilmington, Del.  
Lane & DeGroot .....Long Island City, N. Y.  
Marine Construction & Dry Dock Co. ....New York.  
Rippley Hardware Co. ....Grafton, Ill.  
Truscott Boat Mfg. Co. ....St. Joseph, Mich.  
Warrington Iron Works. ....Chicago.  
Willard, Chas. P. & Co. ....Chicago.

## YAWLS.

Drain, Thos. & Son .....Wilmington, Del.  
Lane & DeGroot .....Long Island City, N. Y.

The star (\*) indicates that the advertisement appears alternate weeks. For addresses see advertisements on pages noted.

*Allen, John F. ....	11	Dixon Crucible Co., Joseph. ....	12	Lake Erie Dredging Co. ....	37	Roach's Ship Yard. ....	1
Almy Water Tube Boiler Co. ....	15	Donnelly Salvage & Wrecking Co. 8		Lane & DeGroot. ....	4	Roberts Water Tube Boiler Co. 15	
American Injector Co. ....	10	Drein, Thos. & Son. ....	4	*Learnmonth, Robert. ....	3	Rochester & Pittsburg Coal &	
American Line. ....	3			Lidgerwood Mfg. Co. ....	6	Iron Co. ....	20
American Ship Building Co. ....	1			Lockwood Mfg. Co. ....	5	Roelker, H. B. ....	5
American Ship Masters Ass'n. ....	2			Logan, Robert. ....	41	Ross Valve Co. ....	12
American Ship Windlass Co. ....	8			*"Long-Arm" System Co. ....	1	Russell & Watson. ....	6
American Steam Gauge Co. ....	1			L. S. & M. S. Ry. ....	45		
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*Atlantic Works, Inc. ....	11						
Audel & Co., Theo. ....	47						
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Baldt Anchor Co. ....	9						
Baker, Howard H. & Co. ....	48						
Bartlett & Snow Co., C. O. ....	2						
Bath Iron Works, Ltd. ....	1						
Bertram's Oil Polish Co. ....	1						
Berry Brothers, Ltd. ....	6						
Blake, Geo. F., Mfg. Co. ....	9						
*Bliss, John & Co. ....	13						
*Bloomsburg & Co., H. ....	9						
Boland, J. J. ....	40						
Bordo, L. J. ....	13						
*Boston & Lockport Block Co. ....	32						
Bourne-Fuller Co. ....	16						
Bowers, L. M. & Co. ....	9						
*Boyer's, L. Sons. ....	48						
Brown, Harvey L. ....	48						
Brown & Co. ....	40						
Brown Holsting Machinery Co. ....	2						
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Buffalo Dredging Co. ....	37						
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Chase Machine Co. ....	7						
*Chelsea Clock Co. ....	37						
Chicago & Gt. L. Dredge & Dock Co. 3							
Chicago Nautical School. ....	37						
Chicago Pneumatic Tool Co. ....	16						
Chicago Ship Building Co. ....	46						
Cleveland & Buffalo Transit Co. ....	45						
Cleveland City Forge & Iron Co. ....	48						
Cleveland Trust Co. ....	36						
Continental Iron Works. ....	2						
Cory, Chas. & Son. ....	13						
*Craig Ship Building Co. ....	18						
Cramp, Wm. & Sons, S. & E. ....	1						
B. Co. ....	11						
*Crandall & Son, H. I. ....	11						
Crane Co. ....	47						
Crescent Ship Yard Co. ....	4						
Date Engine Co. ....	12						
Dearborn Drug & Chemical Wks. ....	14						
DeGrauw, Aymar & Co. ....	9						
DeLauney, Belleville & Co. ....	31						
Delaware River Iron S. B. &							
E. Works. ....	5						
Detroit Ship Building Co. ....	1						
Detroit White Lead Works. ....	1						
Electro-Dynamic Co. ....	1						
Elphicke, C. W. & Co. ....	40						
Elwell, Jas. W., & Co. ....	40						
Elwell-Parker Electric Co. ....	2						
Erie & Western Trans. Co. ....	45						
Fahey & Co. ....	30						
Falls Hollow Staybolt Co. ....	4						
Faust, Wm. H. ....	40						
Federal Trust Co. ....	38						
Flit's S., Sons. ....	37						
Fleming & Co., P. H. ....	40						
Fletcher, W. & A. Co. ....	4						
Fogg, M. W. ....	38						
Fore River Ship & Engine Co. ....	5						
Forest City Boiler Co. ....	37						
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Gilchrist, Albert J. ....	40						
Goodrich Trans. Co. ....	41						
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Helm & Co., D. T. ....	40						
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Herriman, F. D. ....	7						
Holmes, Samuel. ....	40						
Hoyt, Dustin & Kelley. ....	40						
Hunt, Robert W. & Co. ....	41						
Hutchinson & Co. ....	40						
Hyde Windlass Co. ....	48						
International Mercantile Marine Co. 3							
Ironville Dock & Coal Co. ....	38						
Jenkins Brothers. ....	16						
Jenks Ship Building Co. ....	47						
Kahnweiler's Sons, David. ....	4						
Katzenstein, L. & Co. ....	3						
Kidd, Joseph. ....	40						
*Kieley & Mueller. ....	13						
Kingsford Foundry & Machine							
Works. ....	14						
King, Rufus S. ....	40						
Kremer, C. E. ....	40						
McCarthy, T. B. ....	40						
McCurdy, Geo. L. ....	8						
McCutcheon, C. H. ....	13						
Macbeth Iron Co. ....	48						
MacDonald, Ray G. ....	46						
MacLean Hydraulic Signal Co. ....	6						
Manitowoc Dry Dock Co. ....	5						
*Marine Construction & Dry							
Dock Co. ....	5						
*Marine Iron Co. ....	38						
Martin-Barriss Co. ....	9						
Maryland Steel Co. ....	5						
Matteson & Drake. ....	41						
Midland Towing & Wrecking							
Co., Ltd. ....	48						
Milwaukee Dry Dock Co. ....	46						
Mitchell & Co. ....	40						
Mohawk Paint & Chemical Co. 7							
*Moran Bros. Co. ....	47						
Morse & Son, A. J. ....	33						
Mosher, Chas. D. ....	41						
Moulton Steaming Engine Co. ....	13						
Neale & Levy Co. ....	4						
Newman, R. L. ....	40						
Newport News Ship Building &							
Dry Dock Co. ....	4						
New Jersey Zinc Co. ....	7						
New York Belting & Packing Co. 10							
Nicholson Ship Log Co. ....	13						
North River Iron Works. ....	4						
Peck, Chas. E. & W. F. ....	8						
Penberth Injector Co. ....	10						
Pere Marquette R. R. & S. S.							
Line. ....	45						
Phosphor Bronze Smelting Co.							
Ltd. ....	14						
Pickands, Mather & Co. ....	38						
Pinney & Warner. ....	40						
Pittsburg Coal Co. ....	39						
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Red Star Line. ....	3						
Richardson, W. C. ....	40						
*Reilly Repair & Supply Co., Jas. 9							
*Ripley Hardware Co. ....	32						
Rison Iron Works. ....	5						
*Ritchie & Sons, E. S. ....	13						
Sadler, Perkins & Field. ....	41						
Safety Car Heating & Lighting Co. 3							
Sands, Alfred B. & Son. ....	12						
Scherzer Rolling Lift Bridge Co. 9							
Schrader's Sons, A. ....	16						
Schwencke, Kirk & Co. ....	41						
Seaboard Steel Casting Co. ....	32						
Seattle Nautical School. ....	37						
Shaw, Warren, Cady & Oakes. ....	40						
Shelby Steel Tool Co. ....	14						
Sheriffs Mfg. Co. ....	8						
Shipowners Dry Dock Co. ....	16						
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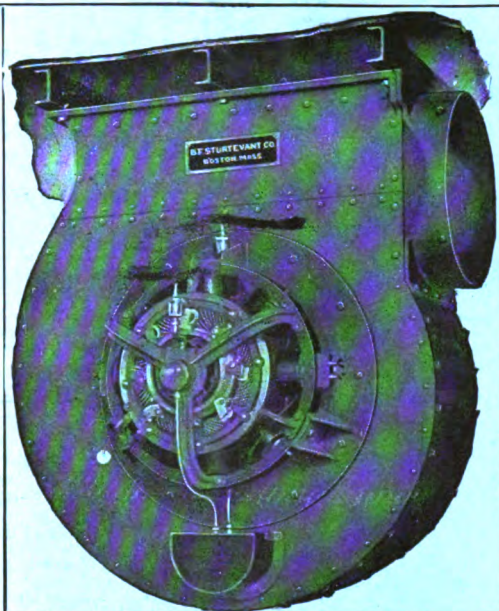
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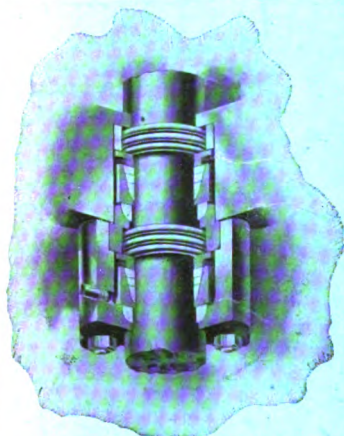
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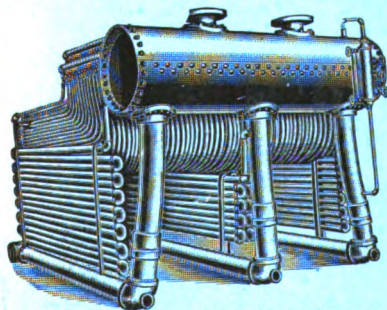
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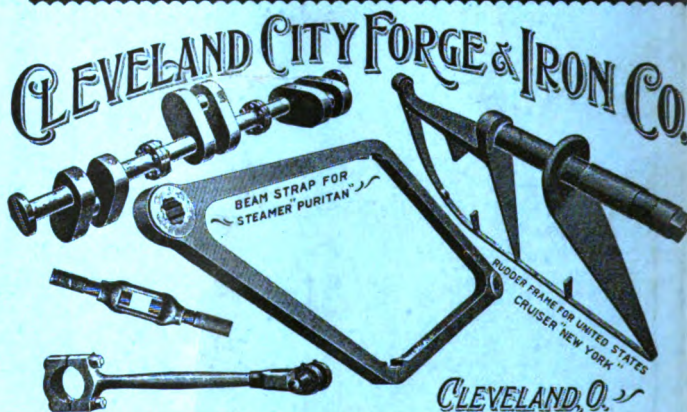
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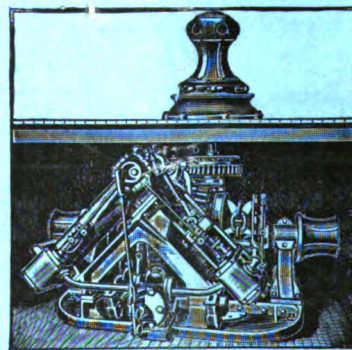
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